



Gender Matters

DIFFERENCES AND CHANGE IN DISABILITY AND HEALTH AMONG OUR
OLDEST WOMEN AND MEN

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Put me back on my bike

(Tom Simpson)

Abstract

This thesis investigates gender differences in health and how they have changed between 1992 and 2002 among very old people. It explores gender differences in the association between disability and health, and gender differences in care utilization among our oldest old people. The studies are based on nationally representative data of the population in Sweden aged 77 and older (SWEOLD).

Results from Study I showed that women generally had more health problems than men. Analyses of change between 1992 and 2002 showed increased prevalence rates for both sexes, especially women. However, women's reporting of poor global self-rated health did not increase. There were no gender differences and there was no change over time in activities of daily living (ADL). Several health indicators seem to be developing differently for women and men.

Study II showed that associations between ADL disability and other health indicators changed between 1992 and 2002, with several health problems and functional limitations becoming less disabling over time. This trend was especially true for women, while for men, the findings were mixed.

Study III found no gender differences in physician visits and dental visits, despite women's worse health and dental status. Marriage was associated with more physician visits for men and dentist visits for women. Results imply that women and unmarried older adults may have unmet health-care needs.

Study IV examined whether the increase in life expectancy at age 65 observed between 1992 and 2002 consisted of years with or without musculoskeletal pain. Results showed that total years without pain decreased for both women and men, but more so for women. Women also had more years with pain added to life.

The results of this thesis suggest an increase of health problems, but not disability, in the oldest Swedish population. However, gender variations in the findings highlight the importance of analyzing health trends separately for women and men.

Sammanfattning

Kvinnor lever längre än män. Trots det har kvinnor i många avseenden sämre hälsa än män. Detta fenomen brukar kallas för könsparadoxen. Under de senaste 20 åren har könsskillnaden i förväntad livslängd minskat, mäns förväntade livslängd har ökat i snabbare takt än kvinnors. Betydligt mindre är känt om hur könsskillnaderna i hälsa och funktionsförmåga har utvecklats över tid.

Det övergripande syftet med denna avhandling är att studera könsskillnader i hälsa och funktionsförmåga hos den allra äldsta befolkningen, samt om dessa könsskillnader har förändrats över tid. Ett annat syfte är att studera könsskillnader i vårdutnyttjande i form av läkarbesök och tandläkarbesök.

Samtliga delstudier baseras på SWEOLD, som är en riksrepresentativ studie av levnadsförhållanden bland personer 77 år och äldre. Intervjuer genomfördes 1992 och 2002 av professionella intervjuare. I studie IV inkluderades även de äldsta åldersgrupperna (65-75 år) från Levnadsnivåundersökningen (LNU) 1991 och 2000. Både de äldres subjektiva självrapporterade mått på hälsa, funktionsförmåga och vårdutnyttjande, samt objektiva tester av deras funktion (t.ex. fysisk, kognitiv, syn, lungfunktion) analyserades. I samtliga delstudier gjordes separata analyser för kvinnor och män.

I den första delstudien undersöktes könsskillnader utifrån ett stort antal indikatorer på hälsa och funktionsförmåga, samt förändringar i könsskillnader mellan 1992 och 2002. Resultaten visade att kvinnor generellt rapporterade mer hälsoproblem och presterade sämre på funktionstesterna än män både 1992 och 2002. Analyser av förändringar över tid visade att hälsan och funktionsförmågan försämrades i de flesta avseenden för både kvinnor och män mellan 1992 och 2002. De största försämringarna återfanns bland kvinnorna. Trots kvinnors generellt sämre hälsa och deras större hälsoförsämringar över tid försämrades däremot inte deras globala självskattade hälsa mellan 1992 och 2002. Resultaten visade inte heller några könsskillnader i förmågan att utföra *aktiviteter i det dagliga livet* (ADL, t.ex. att bada, klara toalettbesök, äta och klä på sig) och *instrumentella aktiviteter i det dagliga livet* (IADL, t.ex. att klara städning, matinköp och matlagning). Resultaten i Studie I antyder att sambandet mellan hälsa och förmågan att klara aktiviteter i det dagliga livet (ADL och IADL) har förändrats över tid.

Mot bakgrund av dessa resultat undersöktes i Studie II könsskillnader i sambandet mellan funktionshinder (i form av ADL och IADL) och andra indikatorer på hälsa, samt om dessa könsskillnader förändrades mellan 1992 och 2002. Resultaten visade att sambanden mellan ADL/IADL och andra hälsoindikatorer var starkare för män än för kvinnor. Det generella mönstret för kvinnor var att sambanden försvagades mellan 1992 och 2002. För män var mönstret inte lika entydigt, vissa samband förstärktes medan andra försvagades. Resultaten från Studie II pekar på att ADL och IADL speglar olika dimensioner av hälsa för kvinnor och män.

En central fråga inom socialgerontologisk forskning är om den ökande livslängden kan kopplas till ett förbättrat hälsotillstånd eller om de år som läggs till livet består av år med ohälsa och funktionsnedsättning. I Studie IV analyserades förekomsten av muskel- och ledvärk för att undersöka om den ökade livslängden mellan 1992 och 2002 bestod av år med eller utan smärta och huruvida det fanns skillnader mellan kvinnor och män. Resultaten visade att för 65-åriga kvinnor bestod den återstående livslängden av en större andel (och antal) år med smärta än för 65-åriga män, både 1992 och 2002. Den ökade livslängden mellan 1992 och 2002 bestod av år med smärta både för kvinnor och för män, för kvinnorna minskade dessutom antalet år utan smärta. Med andra ord, de år som lagts till livet mellan 1992 och 2002 var år med smärta.

De övergripande målen i både hälso- och sjukvårdslagen och tandvårdslagen är god hälsa och vård på lika villkor för hela befolkningen. I Studie III analyserades könsskillnader i vårdutnyttjande gällande besök till läkare och tandläkare. Trots kvinnors generellt sämre hälsa visade resultaten inga könsskillnader i läkarbesök under de senaste 12 månaderna. Däremot var det vanligare bland män än kvinnor att besöka tandläkare. När hänsyn tagits till skillnader i civilstånd och tandstatus var det dock ingen skillnad mellan könen i tandläkarbesök. Civilstånd hade större betydelse för vårdutnyttjande för män än för kvinnor. Gifta män var mer benägna att besöka både läkare och tandläkare jämfört med ogifta män.

Sammanfattningsvis visar avhandlingens resultat att kvinnors sämre hälsa består upp i de allra högsta åldrarna. Resultaten ger inget stöd för att hälsan bland de allra äldsta skulle ha förbättrats mellan 1992 och 2002, varken för kvinnor eller för män. Hälsoutvecklingen, för flera av de studerade hälsoindikatorerna, skiljer sig dock åt mellan kvinnor och män under perioden 1992 och 2002. Resultaten visar även på förändringar i sambandet mellan ohälsa och funktionshinder (ADL och IADL), som dessutom skiljer sig åt beroende på kön, under perioden. Sammantaget pekar dessa resultat på att det blir allt viktigare att välja rätt hälsoindikatorer beroende på syfte och användningsområde. Kunskap om olika hälsoindikatorers utveckling över tid är betydelsefull av flera olika skäl; till exempel vid biståndsbedömning av aktuella behov och vid planering av den framtida inriktningen av vård och omsorg.

List of Original Publications

The thesis is based on the following studies referred to in the text by their respective roman numerals.

- I Schön, P. & Parker, M.G. (2009). Sex differences in health in 1992 and 2002 among very old Swedes. *Journal of Population Ageing*, 1(2), 107–123.
- II Schön, P., Parker, M.G., Kåreholt, I. & Thorslund, M. (in press). Gender differences in associations between ADL and other health indicators in 1992 and 2002. *Aging Clinical and Experimental Research*, 23(2).
- III Schön, P., Parker, M.G. & Thorslund, M. (Manuscript). Gender differences in physician and dental visits among very old persons. Karolinska Institutet & Stockholm University.
- IV Schön, P., Agahi, N., Thorslund, M., Kåreholt, I. & Parker, M.G. (Submitted). The pains of a longer life: Gender differences in life expectancy free from musculoskeletal pain at age 65 in Sweden. Karolinska Institutet & Stockholm University.

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Abbreviations

Databases

| | |
|--------|---------------------------------------|
| LNU | Swedish Level of Living Survey |
| SWEOLD | Swedish Panel Study of the Oldest Old |

Health indicators

| | |
|-----------|--|
| ADL | Activities of daily living, such as bathing/showering, dressing, toileting, moving around, or eating |
| IADL | Instrumental activities of daily living, such as cleaning house, shopping for groceries, using public transport, preparing food, and doing laundry |
| LE | Life expectancy |
| MCI | Myocardial infarction |
| MMSE | Mini-Mental State Examination |
| Peak flow | Peak expiratory flow |
| PFLE | Pain-free life expectancy |
| SRH | Global self-rated health |

Other

| | |
|-----|---|
| ICF | International Classification of Functioning, Disability, and Health |
| OR | Odds ratio |
| SEP | Socioeconomic position |
| WHO | World Health Organization |

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1 Introduction

1.1 Population aging

The twentieth century witnessed a revolution in regard to aging, with dramatic increases in life expectancy by as many as 30 years in many countries. This development has mainly been driven by improved living conditions and medical advancements. Both increased longevity and decreased fertility are to a large extent influenced by the remarkable social and economic development of the past century. Since the increases in life expectancy have been accompanied by decreases in fertility rates, both the absolute number and the proportion of elderly people have increased, thus resulting in an aging population. Population aging implies a shift in age distribution in a society towards older ages (Bengtsson & Scott, 2010).

Population aging is often called one of humanity's greatest triumphs but also one of our greatest societal challenges of the future. There are no signs of stagnation in this demographic development; facing the twenty-first century, aging populations all over the world could lead to economic and social strains (WHO, 2002a). Right now the populous baby boom generation of the 1940s is entering retirement. According to demographic projections of population for the European Union, the number of persons aged 65 years and older is expected to increase by 70 percent from year 2000 to 2050 (Eurostat, 2005). Today, the fastest growing segment of the population in Europe and many other countries is the very oldest of old people, a segment referred to as the oldest old.

Sweden is often described as a forerunner in regard to population aging. During the twentieth century the proportion of people aged 65 and older increased from 8 percent to 17 percent (Bengtsson & Scott, 2010). In the year 2000, Sweden became the first country in the world with more than 5 percent of the total population aged 80 years and older. According to Statistic Sweden's population forecast, the number of people aged 80 years and older in Sweden is going to double in the first half of this century, from 453,000 in year 2000 to 903,000 in year 2050. This demographic challenge will certainly put the Swedish welfare state to test, with presumed severe strains on old-age care, health care, and the pension system.

The prevalence of most health problems increases steeply with age, commonly accompanied by increased needs for medical and social services. The aging of the population, and the numerical increase of elderly people, leads to the inevitable question of whether the years added to life are characterized by good health and independence or by health problems and disability. Population-based studies of health trends among the oldest old are of importance from a planning perspective when estimating future demands and needs for care resources.

1.2 Population aging and gender

The likelihood of living a healthy life is not evenly distributed in the population. Patterns of morbidity and mortality vary among subgroups in society, as exemplified by the considerable discrepancy in health and survival between women and men. It is well documented that women live longer than men all over the world, but they tend to be sicker and report higher rates of morbidity. That is, in terms of mortality, women are healthier than men, but not in regard to morbidity. This is the so-called gender paradox in health (Oksuzyan et al., 2008; Rieker & Bird, 2005).

Although the main causes of death are similar for women and men (cardiovascular disease, cancer, and stroke), there are substantial gender difference in both the disease pattern and manifestation of symptoms. In general, men have a higher risk of acute lethal disease, while women experience more nonfatal conditions and disability (Oksuzyan, et al., 2008; Rieker & Bird, 2005; Verbrugge, 1987, 1989b). Mental health problems provide a good example of the gender-specific manifestations of symptoms, with women having considerably higher rates of depression and anxiety (internalizing disorders), while men have higher rates of substance abuse, antisocial behavior, and suicide (externalizing disorders) (Bird & Rieker, 2008; Directorate-General Health and Consumer Protection, 2004).

Many factors other than gender influence the likelihood of living a long and healthy life, such as socioeconomic position, genetics, health behavior, and access to care. These factors are, however, interrelated with gender.

Because of gender differences in health and mortality, it is likely that, as life expectancy increases, the added years of life will be experienced differently by women and men. However, not much is currently known about the specific nature of gender differences in health and health care utilization among the oldest old, or how these differences have evolved over time. Developing a clearer understanding of the health experiences of women and men during their final years of life is important for being able to anticipate and manage the care needs of the aging population more effectively.

1.3 Gender and health determinants

Health is important in all aspects of life, both on individual and societal levels. Health is an important component of quality of life and the key determinant of independence in old age. Good health is a central resource needed for managing daily life as well as for participating in social life and leisure activities (Arber & Ginn, 1993; Gunnarsson, 2009; Lahelma et al., 2002).

Health and disability among older persons depends on a range of factors or determinants that have surrounded the individual and have accumulated throughout life (Walters, 2004). Gender is an important determinant of health and disability that permeates all aspects of life, cutting across other determinants (Arber & Thomas, 2001). Gender has a great impact on factors such as socioeconomic position, access to care and services, and health behavior (WHO, 2001). The importance of gender as a health determinant has been summarized as follows.

Because gender is embedded in the major social organizations of society, such as the economy, the family, politics, and the medical and legal systems, it has a major impact on how the women and men of different social groups are treated in all sectors of life, including health and illness, getting born and dying (Lorber & Moore, 2002, p. 5).

During the last decades there have been dramatic changes in gender roles and many other social factors that affect women's and men's health and mortality in different ways (for a historical context, see chapter 3, 3.5).

A range of social factors is associated with health. For example, education is associated with both mortality (Erikson, 2001; Zajacova, 2006) and morbidity (Buckley et al., 2005). Another such health related factor is the labor market, both in regard to rates of participation and working conditions.

There have been substantial changes in educational level over time. In Sweden, more recent cohorts of elderly people have a higher educational level than previous cohorts. This has led to a structural increase in socioeconomic status in the elderly population. The greatest increases in education have been made by women. The compositional change to a higher socioeconomic status of the elderly population may influence both mortality and health status as well as utilization of health and social care services in old age (Batljan & Thorslund, 2009; Crimmins, 2004).

Labor force participation has also changed over time. The labor market is gender segregated and affects women's and men's health differently. Women are often disadvantaged in regard to work compensation (in money and status), career opportunities, and the physical and psychosocial work envi-

ronment. Domestic work is another area of importance for gender-related health. Despite great changes, women still perform the major share of domestic work (Hammarström et al., 2001). Paid employment is generally good for both women's and men's health, but women's increased labor force participation has contributed to role conflicts and a higher total workload (U. Lundberg, 2002).

Understanding the evidence on health determinants over the life course will assist greatly in designing policies and programs that facilitate good health (WHO, 2001). Therefore, when studying gender differences in health it is important to consider earlier life course factors that change over time and that are likely to affect women and men differently.

1.4 Health, disability, and care needs?

Health problems are strong determinants of disability. For example, stroke is a medical condition that requires extensive medical care and often leads to disability. Stroke incidence increases steeply with age (Feigin et al., 2003). Due to gender differences in a range of risk factors, both social and biological, there are clear gender differences in incidence as well as in the consequences of stroke (Appelros et al., 2009).

The Disablement Process model, developed by Verbrugge and Jette (1994), outlines the causal main pathway from pathology, via impairments and functional limitations, to disability.

1. *Pathology* includes biochemical and physiological abnormalities (disease, injury and innate or developmental conditions) and could be chronic (progressive diseases) or acute (short-term diseases and injuries). Pathology is often detected through impairment.

2. *Impairment* refers to dysfunctions and structural abnormalities in specific body systems that can have consequences for physical, psychological, and social functioning.

3. *Functional limitations* are restrictions in basic everyday actions that are physical (walking, mobility, hearing and seeing problems, and communicating) and/or psychological (cognitive and emotional functions such as short-term memory, comprehensible speech, and orientation in time and space).

4. *Disability* is difficulties in performing activities as a consequence of health or a physical problem. Studies of older people most often focus on disability in ADL and IADL. There are several ways to measure disability. The standard procedure is through interviews (self-reports or proxy reports). Another way to measure disability is by observation.

Verbrugge and Jette (1994) defined disability as the gap between an individual's capability – physical, psychological, and cognitive – and the activity's

demand. This means that disability is a contextual concept rather than a personal characteristic. Thus, functional limitations (action) are an individual's capability without respect to situational demand, while disability (activity) is a social process (Verbrugge & Jette, 1994).

Disability arises from an interaction between an individual's functional status and a wide range of contextual factors that surround the individual – risk factors, extra-individual factors, and intra-individual factors. Most of these are affected by gender in the form of *social factors* (education, social policy, and gender norms), *personal factors* (biology and personality), *health and social services* (the welfare system), *physical environment* (housing standards and access to public buildings, transportation, and microwave ovens), *economic factors*, and *behavioral factors* (smoking, alcohol, and physical activity).

Disability is, in turn, strongly associated with needs for social services and care. The association between health and disability is illustrated by the International Classification of Function, Disability, and Health (ICF), which is a framework for health and disability developed by WHO. Figure 1.1 shows a representation of the model of disability, the basis for ICF. Similar to the Verbrugge and Jette model, the ICF model proposes that disability and functioning are the results of interactions between health conditions and contextual factors. The ICF model classifies health and disability from body, individual, and societal perspectives and differentiates between four components of health and function: *body structure*, *body function*, *activities*, and *participation*. The ICF model suggests that these components have different implications for the interventions of care and services that are needed. For instance, diseases and symptoms (body structure and function) call for medical care. Limitations in activities, on the other hand, imply a need for social services, rehabilitation, therapy, assistive devices, and housing adaptations. Participation restrictions might call for interventions on both individual and societal levels in the form of accommodation and other environmental changes, as well as public education and antidiscrimination legislation (WHO, 2002b).

Diseases and symptoms are commonly used health indicators in population based studies of elderly people. But without information of severity and consequences, these measures do not tell us much about the need for different types of social services (home care or institution). Persons with ischemic heart disease or degenerative disorders such as Parkinson's disease might have a need for institutional living, but they could also live a completely independent life. Therefore, many studies include indicators of functional limitations and disability (Parker & Thorslund, 2007). These measures reflect the cumulative effect of pathology, impairment, and function.

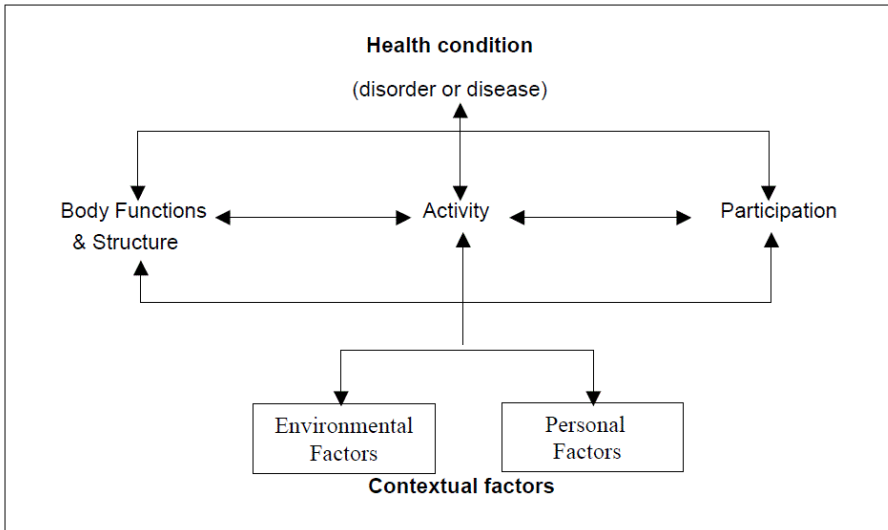


Figure 1.1. An interpretation of interactions between the components of ICF.
 Source: World Health Organization (2002).

1.5 Population aging and the welfare state

Health and social care services for elderly people are cornerstones of the Swedish welfare system. The general principles of the Social Services Act and the Health and Medical Services Act are to provide social services and health care for people according to need, regardless of sex, age, socioeconomic position, ethnicity, and geographical location (Health and Medical Services Act, SFS 1982:763; Social Services Act, SFS 2001:453). In brief, the health care system deals with the medical issues and “cure,” while the social services system provides “care” for the consequences of poor health (disability and dependency). Elderly people often need both medical and social services.

Gunnarsson and Szebehely (2009) point out that the way public care services for elderly people are organized and function is of great importance to many groups in society. It is of importance to elderly people as the recipients of services in managing their daily life, but also for their relatives who provide the informal care (mostly elderly wives) and for the personnel in the care services sector (predominantly women). The declines in public old-age care during the 1990s were accompanied by increases in informal care. Public old-age care has been concentrated on the most frail and dependent elderly population, while those with less extensive needs are referred to informal caregivers or privately paid help, which means that an increase in care is

often provided by middle-aged daughters and elderly wives (Szebehely, 2003).

The care of elderly people has a high priority on the social policy agenda, and is of great concern to many people. Municipal old-age care is the largest part of the Swedish social services budget (National Board of Health and Welfare, 2011). In 2009 the cost of the municipal old-age care was estimated at 53 percent of the total cost of social services. The largest part of old-age care is financed through municipal taxes and government grants.

Social work regarding old-age care takes place on different levels: individual, family, organizational, and societal. National, municipal, and private providers are involved. The work of this dissertation has implications in one way or another at several levels. The main outcomes studied, and the changing associations between them, are of importance when considering future needs for care and services in the population.

2 Aims

There are two general aims of this thesis: One objective is to describe and analyze gender differences as well as changes over time in health, physical function, and disability among the oldest old people in Sweden. To this end, a wide range of both self-reported and test-based health indicators were analyzed. A second objective is to study whether there are any gender differences in the utilization of care services regarding visits to physicians and dentists. In this thesis, we have not attempted to distinguish between sex (biological) and gender (social and cultural) differences. As explained in 3.2, we use the terms interchangeably.

2.1 Specific aims

To describe sex differences in health and disability in 1992 and 2002 among the oldest old people in Sweden (Study I).

To analyze whether any changes in the sex differences in health occurred between 1992 and 2002 (Study I).

To examine gender differences in the association between disability, as measured by ADL and IADL, and other health indicators (Study II).

To analyze whether any changes in the gender differences of the associations between disability and other health indicators occurred between 1992 and 2002 (Study II).

To explore gender differences in care utilization, regarding visits to physicians and dentists, in a sample of very old community-dwelling persons (Study III).

To describe gender differences in the proportion of years free from musculoskeletal pain in relation to life expectancy at 65 in 1991/1992 and 2000/2002 (Study IV).

To examine whether the increased life expectancy between 1991/1992 and 2000/2002 consists of years with or without musculoskeletal pain for women and men (Study IV).

3 Conceptual issues and explanatory models for gender differences in mortality and morbidity

Gender definitely matters. The chance to live a long life in good health is not evenly distributed between men and women. The sex of a newborn baby has profound influences on what her or his future life has to offer. Gender structures an individual's opportunities and life chances (Ginn & Arber, 1995; Walters, 2004).

3.1 Health indicators

There are many ways to measure health and functioning in the older population, and there is no consensus about which way is best. One way of monitoring health and health trends is to measure mortality rates. Mortality is a dichotomous and valid variable that is relatively easy to measure and follow over time when we have accurate vital statistics.

Measuring morbidity is a more complicated issue, and there are many ways to do it, such as self-reports of general and specific diseases, symptoms, or number of medications. In contrast to mortality, morbidity is a more ambiguous concept that encompasses many aspects of physical, cognitive, and mental health as well as social and environmental factors (Parker & Thorslund, 2007). Morbidity has shown to be a strong predictor of both mortality and functional status (Manton, 1990) and indicates a need for medical care.

Many population-based health surveys among elderly people include both self-reported indicators and "objective" tests that measure physical and cognitive functions, such as the ability to walk, climb stairs, lift, reach, grasp, see, and hear. Mobility (walking ability) is an oft-included indicator of functioning in studies of older people because of its close association with independent living.

Another common way to measure functioning in population-based health studies is to use measures of disability, most often ADL (bathing or showering, dressing, toileting, and eating) and IADL (cleaning house, shopping for food, using public transportation, cooking food, and doing laundry). ADL and IADL encompass more than physical ability. Poor ADL and IADL may also be a consequence of loss of sensory, physical, or cognitive functioning. Since ADL and IADL disability includes tasks necessary for independent living in the community, these measures provide good information on the need for social services.

When measuring health among old people there are some special challenges. Elderly people often have several health problems simultaneously that are interrelated. Extended survival to advanced ages has led to increased prevalence rates of comorbidity in the older population (Meinow, 2008; Rosén & Haglund, 2005). There may be no diagnosable disease despite symptoms and functional limitations. Manton (1990) argued that the high rates of comorbidity in the older population and the synergy effects of simultaneous disease processes, in combination with the interaction of diseases with age degeneration, require measures that take the cumulative effects of morbidity into account when studying health among older people.

3.2 Sex and gender

In gender research the concepts of sex and gender have different meanings. Sex refers to biological and physiological differences between men and women – chromosomes, hormonal profiles, internal and external sex organs, and secondary sex characteristics (sex-specific physical traits that are not directly part of the reproductive system) that define male and female (Hammarström, 2002; WHO, 2010).

The concept of gender, on the other hand, refers to the social, cultural, and historical construction of roles, behaviors, activities, and attributes that a certain society regards as appropriate for each gender. Gender denotes what is masculine and feminine. Since gender is a social construction, it is dynamic, and substantial variations may be seen between different human societies and over time (Hammarström, 2002; WHO, 2010). Some examples of gender characteristics are differing working conditions for men and women, the division of domestic work, social networks, social and leisure activities, risky behavior, care-seeking behavior, and the distribution of resources (Hammarström, et al., 2001; Shye et al., 1995; Östlin, 2002).

In the studies included in this thesis (with the data used) it was not possible to differentiate between sex and gender. Indeed, the effects of biological and social factors are interrelated. Therefore, we use the terms interchangeably.

3.3 The gender paradox in health

The gender paradox in health refers to women's greater life expectancy compared to men's while reporting higher rates of morbidity, disability, and health care consumption (Nathanson, 1977; Oksuzyan, et al., 2008; Rieker & Bird, 2005; Verbrugge, 1989a; Verbrugge & Wingard, 1987; Wingard, 1984). Although the gender and health paradox is well documented and has been studied for a long time, neither its reasons nor its mechanisms are completely understood. Nor do we understand to what extent these differences are the result of biology (sex) or social roles (gender) (Austad, 2006; Bird & Rieker, 2008; Oksuzyan, 2009).

It is an established fact that women live longer than men and have lower mortality rates at all ages, even in utero (Austad, 2006; Kalben, 2000). Previously there were exceptions among some very poor countries (Pakistan, India, Afghanistan, and Bangladesh), where girls and women were severely disadvantaged. But since 2006 women outlive men all over the world (Barford et al., 2006; Oksuzyan, et al., 2008). Hence, it seems that women have an advantage over men regarding longevity.

Although women live longer than men, they tend to, on average, report poorer health. There are pronounced sex differences both in the illness panorama (the prevalence and incidence of disease) and in the types of disease processes men and women have. Men experience more acute lethal disease (myocardial infarction and many types of cancer) and die younger, while women live longer but have a higher risk of nonfatal conditions and chronic degenerative processes (rheumatoid arthritis, osteoporosis, and diabetes) and disability (Arber & Cooper, 1999; O. Lundberg, 1990; Macintyre et al., 1999; Rieker & Bird, 2005; Verbrugge & Wingard, 1987).

During recent decades the gender paradox in health has been challenged by various studies suggesting that gender differences in morbidity might be smaller than previously assumed (Arber & Cooper, 1999; Danielsson & Lindberg, 2001; Gold et al., 2002; Lahelma et al., 1999; Lahelma & Rahkonen, 1997; Macintyre et al., 1996). These studies imply that the traditional gender paradox in health is oversimplified.

Some researchers refer to "new" paradoxes. In a British study (age 60+) Arber and Cooper (1999) argue that women's substantially higher disability

rates, despite negligible gender differences in self-assessed health, constitute a new gender and health paradox. It has also been argued that women's lower mortality rates all over the world do not indicate that women are more privileged than men. On the contrary, Danielsson and Lindberg (2001) suggest that women live longer despite having fewer resources, less control over their lives, and a greater likelihood of being economically, socially, and materially disadvantaged than men.

3.4 Explanatory models of gender differences in health and mortality

The association between gender and health (function and disability) has shown to be a very complex research field. The pathways to poor health and disability are often gender specific and include a number of determinants of biological and social character (WHO, 2001). A range of possible explanations of gender differences in health, disability, and mortality have been suggested in the scientific literature. Basically, they could be divided into two broad categories – biological and social models.

Biological and genetic models. These models focus on sex differences in biological composition (genes, hormones, and physiology) that might result in differences in men's and women's health and mortality. Biological factors are primarily universal in nature and change very slowly.

Social, cultural, environmental, and behavioral models. These models highlight gender differences in socially determined factors (social position, working conditions, family life, health behavior, care-seeking behavior, and reporting differences) that might affect men's and women's health differently. Social factors can, and often do, change over time (Austad, 2006; Bird & Rieker, 2008; Hammarström, et al., 2001; Kalben, 2000).

A growing body of research suggests that these models cannot alone provide a complete framework for analyzing causes of gender differences in health. Many researchers see the need to synthesize biological and social models when explaining the gender gap in mortality and morbidity (Bird & Rieker, 2008; Hammarström, et al., 2001; Rieker & Bird, 2005; Verbrugge & Wingard, 1987).

3.4.1 Biological explanations

Most biological explanations of gender differences in health and mortality stem from physiological processes that are associated with pregnancy and childbirth. There are some fundamental biological differences between men and women, for instance, in genes, hormones, immune system response, as well as in disease patterns, and disease processes that can lead to sex differences in morbidity and mortality (Austad, 2006; Bird & Rieker, 1999).

3.4.1.1 Sex hormones

Sex hormones have attracted much attention for explaining gender differences in health and mortality. The estrogen hypothesis suggests that estrogen has a protective effect on cardiovascular disease for women of reproductive age (Hemström, 2001a; Oksuzyan, et al., 2008; Waldron, 1983).

3.4.1.2 Immune system

Another widespread hypothesis, based on the assumption that longevity primarily is determined by the immune function, is that women live longer because, throughout their lives, they have a more active immune system than men. The female sex hormone (estrogen) stimulates the immune system, while the male sex hormone (testosterone) has an attenuating effect. That is, because of women's better immune system, they are more resistant to infection and therefore live longer. However, it has also been put forward that women are more likely to have autoimmune diseases, due to an overactive immune response. That is, women's more active immune system might lead to a greater risk of having some diseases (autoimmune thyroid, rheumatoid arthritis, and systemic lupus erythematosus) (Austad, 2006; Bird & Rieker, 1999; Oksuzyan, et al., 2008).

3.4.1.3 X chromosome hypothesis

An individual's sex is determined by the sex chromosomes, thus creating the fundamental difference between men and women. Women have two X chromosomes, while men have one X chromosome and one Y chromosome. The Y chromosome is decisive for the development of the male sex. The X chromosome hypothesis proposes that women's double set of X chromosomes is associated with longer life spans. In short, this means that women have two cell lines, one X chromosome from the father and one from the mother. Women's double set of X chromosomes seems to be protective and prevents the expression of most X-linked diseases (hemophilia and Duchenne muscular dystrophy). In the aging process, the existence of two X chromosomes means that the "stronger" of the two will gradually predominate, and thereby contributing to lower mortality late in life (Austad, 2006; Christensen et al., 2001; Waldron, 1983).

3.4.2 Social explanations

The conditions in which people live and work during their life have an influence on their health (Kuh et al., 2003). In contrast to biological factors, which change very slowly, external determinants to ill health, such as social factors, personal factors, behavioral factors, health and social services, physical environment, and economic factors, change more rapidly. As shown in figure 4.1 (see chapter 4), gender differences in mortality change over time. Substantial variations between nations have also been observed. This suggests that social factors are influential. Social factors seem to affect both morbidity and mortality differently for men and women, and the impact may vary over time.

Differences in life circumstances between women and men have been suggested to contribute to gender differences in health. How society is structured is of importance; the different conditions for men and women at work, in family life, in social networks, and in social activities all have an impact on men's and women's health (Hammarström, et al., 2001).

3.4.2.1 Labor market participation and socioeconomic position

Sweden has a long tradition of striving against gender inequalities in many areas. A strong welfare state and policies have facilitated women's participation in the labor market. In Sweden today, women's labor force participation is one of the highest in the world (Statistics Sweden, 2006b). However, this has not always been the case. The cohorts of women included in this thesis, for example, were often housewives or only partially in the labor force. The Swedish housewife era peaked around 1950, and after 1960, women's labor force participation increased dramatically (Nermo, 1999).

Today, the Swedish labor market is highly sex segregated. Women are more likely to work in lower status jobs with lower wages and more likely to work part time; as a consequence, they have lower pensions.

Working outside home has shown to be beneficial for women's health, a finding which is partly a result of healthy selection into the labor force (Hemström, 2001b). It has also been shown that men are more likely to relax at the end of the workday, while women's levels of stress hormones rises as they move on to the next "shift" at home. Swedish women are at a high risk of double exposure when combining paid and unpaid work (U. Lundberg & Frankenhaeuser, 1999).

Socioeconomic position (SEP), including education, income, and previous occupation, is associated with health, even among older people. It is well established that lower SEP is associated with higher mortality risk and poor-

er health and functional status (Erikson, 2001; Fors, 2007; Galobardes et al., 2007; George, 1996; Kunst et al., 2005; Marmot, 2004). The composition of the population in regard to SEP is changing over time. For example, women in older cohorts generally have fewer years of education compared to men, a condition that is changing. The association between SEP and health has been shown to be weaker among older women than men (Parker et al., 1994).

Results from the United States have shown that educational differences in healthy life expectancy have increased over time due to a widening gap in mortality and morbidity (Crimmins & Saito, 2001). Gender differences in disability and disability-free life expectancy are greater among persons with low SEP than persons with high SEP (Crimmins & Saito, 2000).

3.4.2.2 Civil status

Another social factor that might contribute to gender differences in health is civil status. Marriage has been shown to be associated with health benefits, with better health and lower mortality risk for married persons compared to unmarried persons. Moreover, marriage seems to benefit men in regard to health, while its main benefit for women is in socioeconomic conditions (Hu & Goldman, 1990; Lennartsson & Lundberg, 2007). This association can primarily be explained by two mechanisms: either marriage is good for health, or healthier persons are selected into marriage. Empirical evidence has been found for both explanations (Goldman, 1993).

Younger and middle-aged women are more likely to become single parents (Rieker & Bird, 2005) and informal caregivers to their elderly parents, while elderly women more often are caregivers to their older husbands (Szebehely, 2009). Conflicts between working life and family commitments, which in turn could lead to decreases in income and increases in expenses, seem to affect women to a greater extent than men. Hence, women are more likely to experience economic hardship over the life course than men. This is especially true in older ages as women outlive their men and are therefore more likely to suffer both from poor economy and support (Bird & Rieker, 1999).

3.4.2.3 Lifestyle and behavior

It is often proposed that men's lifestyles kill. Research has consistently shown that there are gender differences in lifestyle and health-related behavior. A range of unhealthy behaviors is more prevalent among men. Men are, for example, more likely to engage in competitive behavior and risk-taking such as smoking, alcohol consumption, and less safe driving habits than women. Men are also more exposed to occupational hazards, which include both toxins and accidents (Hammarström, et al., 2001; Rieker & Bird, 2005; Waldron, 1993). These factors contribute to men's higher risks of cardiovas-

cular diseases, lung cancer, chronic obstructive pulmonary diseases, cirrhosis of the liver, and accidents (Oksuzuyan, et al., 2008; Waldron, 1993).

Smoking has received a great deal of attention as a health-related behavior. Diseases of the respiratory system are increasing rapidly among women due to changing gender patterns in smoking, with women increasing their rates of smoking while men have decreased theirs. Over the past twenty-year period, women's lung cancer rates have more than doubled, while men's have diminished (Danielsson & Talbäck, 2009). New cohorts of elderly women in Sweden have higher smoking rates than their predecessors (Ahacic et al., 2008; J. Persson et al., 2004). This means that upcoming cohorts of elderly women will have experienced greater participation in the labor force, considerably higher smoking rates, and other patterns of alcohol consumption than previous cohorts.

3.4.2.4 Reporting behavior and care-seeking behavior

A common explanation for women's higher levels of morbidity is that there are gender differences in the way that symptoms are perceived, evaluated, and acted upon. It is often proposed that women are more likely to report illness, are more prone to seek help, and have more flexibility in their lives to accommodate illness. The results of the few studies that have examined men and women with similar states of health or symptoms are inconsistent, and they give little support to this assumed greater tendency (Macintyre, et al., 1999). Arber and Cooper (1999) examined health among British men and women aged 60 years and older. They found that, for a given level of disability, it was men rather than women who assessed their health as poor.

Most studies show that women in the general population consume more medical care and medication than men. A common explanation for women's higher care utilization is that, in general, they are socialized to pay attention to pain and discomfort, while men are socialized to ignore physical discomfort (Merrill et al., 1997). Another contributing factor is that women often have a stronger social network that may encourage them to seek help. On the other hand, women generally have fewer economic resources than men, and elderly men are more likely to have a wife to encourage and facilitate seeking help.

3.5 Historical context

The health and survival of older women and men are affected by experiences accumulated throughout their lives. Biological, social, and psychosocial processes operating throughout life, from childhood through adulthood, affect health in later life. Persons who were born around the same time period (a birth cohort) share similar working conditions, health behavior, and social norms (Agahi, 2008; Fors, 2010; Kuh & Hardy, 2002). Periods of starvation, war, and epidemics also set their imprint on a cohort. The impact of the experience varies depending on age at exposure. Impact varies also by social class. And circumstances often affect women and men differently.

Today, Sweden is a wealthy modern welfare state. This has not always been the case. The Swedish welfare state is a post-World War II phenomenon (Thorslund & Silverstein, 2009). The cohorts studied in the present thesis were born in the late nineteenth and early twentieth century, when Sweden was a largely rural and poor agricultural country. These cohorts were middle-aged by the time the welfare state began to emerge.

Industrialization occurred relatively late in Sweden (around 1870–1920) compared to many other European countries. The oldest persons in the SWEOLD studies were born during the transition from a rural agricultural country to an urban industrial one. The living areas in the urban districts were overcrowded, with poor housing and sanitary conditions, and water- and airborne infections spread easily. There were open, stinking drainage ditches in the middle of the housing areas. Diarrhea, diphtheria, scarlet fever and other epidemics were common among children, while adults often suffered from tuberculosis. The living conditions were similar in the northern parts of Sweden, with primitive shanty towns around the mines and saw-mills. Working conditions were harsh and working days were long. Excessive alcohol consumption was common among men. For women working at home, domestic conditions could also be difficult due to a lack of indoor plumbing, large families, and restriction of space. A typical apartment among working-class families consisted of one room and a kitchen or kitchenette. Families often housed one or more lodgers in order to get extra income (Sundin & Willner, 2007).

During the period between the wars, 1920–1945, the idea of the welfare state took shape but conditions were still poor. In a speech to the Swedish Parliament in 1928, the leader of the Social Democratic Party, Per Albin Hansson, used the metaphor of “the people’s home” (*folkhemmet*) for a well-functioning society. The vision was a system based on equal suffrage, democracy, and collective security (Sundin & Willner, 2007). Universal suffrage in government elections was introduced in 1909 for men, while women

were not entitled to vote before 1921. Access to health care services began to increase during this period but was still not widely available.

The postwar era, when SWEOLD participants were adults, was characterized by rapid economic growth. The welfare state was developed, with low unemployment and steadily increasing wages, and the public sector expanded with improved public health service and social security safety nets (Sundin & Willner, 2007). This societal development seemed to affect women and men differently in terms of health and mortality. For example, Hemström (2001a) found that the increases in material and economic resources appeared to have been accompanied by increased alcohol and cigarette consumption among men, and that economic growth since the 1950s has been more beneficial for women than men in regard to survival.

During the postwar economic prosperity, many families were able to live on one salary, in a male-breadwinner–female-housewife model. Therefore, the 1950s and 1960s sometimes are described as the “housewife era.” However, the housewife era was a historical parenthesis that was followed by a dramatic increase in women’s labor force participation. Over the course of two decades (1960s and 1970s) more than half a million married Swedish women entered the labor force; by the beginning of the 1980s, the housewife era was definitely over.

The circumstances of women’s occupations changed from agricultural society through industrialization to modern-day Sweden, a postindustrial service society. During this transition, the organization of care work was of particular importance to women’s occupations (Axelsson, 1992). Agriculture was the dominating occupational sector in preindustrial society. At that stage, the family was the production unit; women combined agricultural productive work with care work, which led to a double load of domestic and agricultural work for women.

As a consequence of urbanization and industrialization, productive work was moved from the family to the factory, while the care work remained in the family. It was thereby no longer possible for families to combine productive work and care work. Men became wage workers in a workplace outside the home, while women became housewives and worked unpaid in the home. In the postindustrial form of social organization, paid work has moved to the service sector. Women are employed in the public sector and care work is a part of the labor market. That is, care work became a part of production.

Successive cohorts of older people have had very different living situations and housing standards. A report on living conditions and care needs of elderly people in Uppsala County in the late 1950s revealed that most of the pensioners (67 years and older) lived in rented apartments. Around 80 percent of

the apartments were equipped with electric or gas stoves, central heating, sewers and water supply, and toilets. Less than 50 percent of the pensioners had refrigerators, bathrooms, or telephones. There were, however, great social-class differences. Nearly all persons from the upper classes, but only 60 percent from the lower classes, had access to these conveniences (Berfenstam & Hedqvist, 1960).

In a historical overview of aging in a long-term perspective in Sweden, Sundström and Thorslund (2011) used surveys covering more than fifty years, from 1954 until today, to describe living conditions and health among older Swedes. They found substantial improvements over time in health and living conditions and a dramatic expansion of public services. They also found that more recent cohorts of older people have totally different lifestyles from earlier cohorts regarding partner choices, time use, and finances. Today's older people often own their modern residence, country houses, and cars, and holiday abroad; more than 90 percent have a cell phone, and more than half of them have an email address.

The period changes in housing standards can be illustrated by the questions included on the living-condition surveys. For example, in LNU 1968, participants were asked if they had hot water, sewers, shower/bath, indoor toilet, central heating, stove, refrigerator, telephone, radio, or TV. Many of these questions have been excluded, concurrent with improved housing standards.

In addition to the extensive social changes of the mid-century, there have been great developments in medical technologies to diagnose, monitor, or treat diseases and chronic conditions (even in old age) during the late twentieth century. Medicine, surgery (cataract, hip, and knee), and assistive technology (hearing aids and walking frames) contribute to cure and manage health problems in the population. Improved housing standards and adaptations, accessibility in public spaces, public transportation, microwave ovens and ready-made dinners have facilitated activities and participation in everyday life for older people even if their function is limited.

During the twentieth century there have been extensive structural changes in general living and working conditions that have benefited the health of the older population. Different birth cohorts reaching old age have experienced very different living conditions during childhood and middle age.

The long-term effects of these rapid changes can be seen in successive cohorts of elderly people. Even between the SWEOLD samples of 1992 and 2002, we can see changes in a number of factors, which can be seen as resources in regard to health. For example, higher educational levels are associated with better health. Earlier cohorts of older people were dominated by persons with elementary schooling, which is now changing rapidly. Accord-

ing to SWEOLD 1992, 23 percent of older persons (aged 77+) had education higher than elementary school. Corresponding figures in 2002 were 32 percent, and preliminary results from the 2010 survey wave indicate an increase to more than 50 percent. The proportion of women that had been active in the labor market increased from 75 percent in 1992 to 82 percent in 2002. Accordingly, the proportion that had mainly been housewives decreased from 26 percent in 1992 to 19 percent in 2002.

Great changes have also been observed in successive cohorts approaching retirement age. Parker and colleagues (2010) used LNU to analyze four different cohorts between 1968 and 2000 aged 50–64 years in regard to health and other health-related variables. Between 1968 and 2000, the proportion of people in white-collar occupations and educational level increased. Smoking increased among women and decreased among men. Utilization of medical and dental care increased for both women and men. The average BMI increased for both women and men, but most among men. The ability to appeal a decision by a public authority improved for both women and men, which may reflect a person's likelihood to actively seek services and demand entitlements.

SWEOLD participants were born, grew up, and lived their lives under circumstances very different from those that exist in Sweden today. The changes that occurred during the twentieth century were so rapid and extensive that the effects of these changes are discernible between the cohorts studied in 1992 and 2002.

3.6 Differences in men's and women's health and mortality – biological, social, or both?

As described above, differences in health and mortality between men and women are paradoxical and complex. Men and women obviously have some different biological features that lead to advantages and disadvantages over the other sex regarding health and mortality. Considerable variations within the sexes have also been observed, which in turn differ by social and cultural circumstances. Furthermore, gender differences in health and mortality vary between societies and countries, as well as between time periods. Taken together, this implies that gender differences in health and mortality to a great extent are influenced by social conditions. Therefore, neither biological nor social models can alone provide sufficient explanations of gender differences in health and mortality (Bird & Rieker, 2008).

4 Gender and health trends

4.1 Increased life expectancy

Sweden has a very long tradition of statistic production with excellent demographic data from the middle of the eighteenth century. These unique data offer an opportunity to analyze (even for men and women separately) the dramatic changes of Sweden transforming from a poor agricultural society into a wealthy industrialized welfare state. These revolutionary changes have most likely affected men's and women's lives in different ways.

During the second half of the eighteenth century, life expectancy at birth was 36.6 years for women and 33.7 years for men in Sweden. From then to today, life expectancy has more than doubled. Today, Sweden has one of the highest life expectancies in the world, 79.5 years for men and 83.3 years for women in 2009 (Statistics Sweden, 2010).

Many countries have experienced a remarkable increase in life expectancy by about 30 years during the twentieth century. The increase in life expectancy has been virtually linear with no signs of stagnation. During the first half of the twentieth century, gains in life expectancy were mainly due to decreases in infant and young-age mortality. There was a shift in mortality patterns from infectious diseases to cardiovascular diseases as the major cause of death. After World War II, the increase in life expectancy has mainly been driven by falling mortality rates in the ages 65 years and older (Christensen et al., 2009).

4.1.1 The development of life expectancy for women and men

Today, women outlive men in all countries of the world (Barford, et al., 2006; Oksuzyan, et al., 2008). Since data have been available, the sex differences in life expectancy, though small, have been in favor of women. In the early twentieth century, the sex gap in life expectancy started to grow in the developed world. It is interesting to note that the widening of the sex gap in life expectancy occurred at different time points in different countries. For example, in countries like England, Wales, and France, the widening of the gap emerged around 1890, while it emerged around 1950 in Scandinavia. Around 1980, the sex gap began to narrow, about the same time point in most countries.

Figure 4.1 shows the development of life expectancy at age 65 for men and women separately 1751–2008 in Sweden. The life expectancy increased steadily for both women and men, and the sex gap was around one year in favor of women between 1750 and 1950. From 1950, the sex difference in life expectancy increased dramatically, with women gaining more for every year, until the 1980s, when it started to decrease.

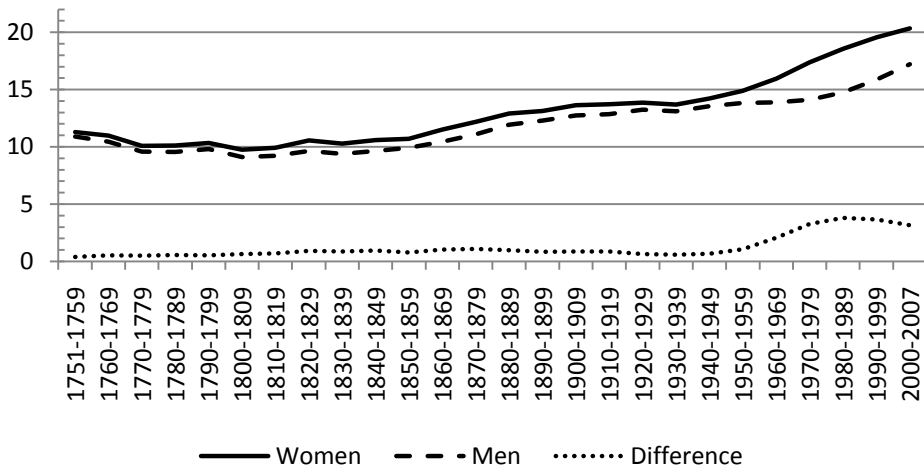


Figure 4.1. Life expectancy at age 65 in Sweden, and sex differential in life expectancy at age 65, 1751–2007. Source: Statistics Sweden.

The decreased mortality from infectious diseases resulted in an increase in life expectancy that was similar for both men and women up until the mid-twentieth century. At the end of the 1950s and the beginning of 1960s the decreases in men’s mortality stagnated, while women’s mortality continued to decrease. The sex gap in life expectancy at age 65 increased from 0.7 years in the 1940s and 1950s to 3.8 years around 1980. Since the 1980s, the development in life expectancy has been more favorable for men than for women due to greater decreases in middle age mortality among men (Statistics Sweden, 1999).

Women’s longer life expectancy all over the world, in different cultures, may indicate that there is a biological/genetic or “natural” sex difference in longevity. On the other hand, the changing associations over time between men’s and women’s life expectancies imply that the sex gap has to do with social and environmental factors (Macintyre, et al., 1996).

The widening of the sex gap in mortality that emerged during the 1950s was due to stagnation in the decrease of men's mortality. The two most common causes of death among men were cardiovascular diseases and accidents. This increased mortality was not evenly distributed in the population; it was restricted to male industrial workers. For male white collar employees, the mortality rates continued to decline. Among women, the mortality rates declined for both groups of workers. The narrowing of the gender gap in life expectancy that began during the 1980s was mainly due to men's greater decrease in cardiovascular mortality compared to women. Today, it is primarily the decrease in mortality among elderly people that is driving the increase in life expectancy (Danielsson & Lindberg, 2001; Statistics Sweden, 2007).

4.1.2 Old age is dominated by women

Worldwide, more boys are born than girls. With increasing age, the number of males versus females converges and reverses due to men's higher mortality risk in all ages. Therefore, the older ages are dominated by women. The female surplus in old age is smaller in Sweden than in many other countries, because of Swedish men's relatively low mortality.

Today, there are 24 percent more women than men in Sweden aged 65 years and older, and the numerical gender difference increases with age. In the age group 85+ there are twice as many women as men (Statistics Sweden, 2010).

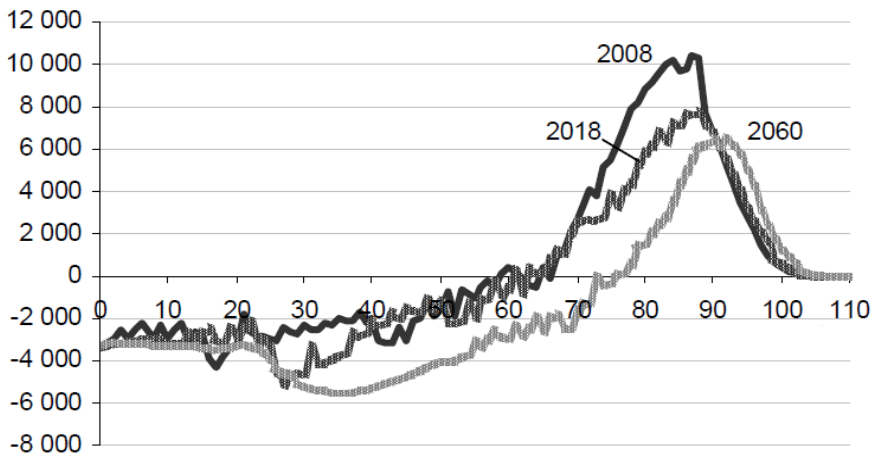


Figure 4.2. Surplus of females in Sweden 2008 and projections for 2018 and 2060. Number of women minus number of men. Source Statistics Sweden (2009).

Figure 4.2 shows the absolute numbers of women minus men in Sweden in 2008, and projections for 2018 and 2060. It is clear that older ages are dominated by women. According to the prognosis, the relationship between the number of men and women is going to change. The female surplus in older ages is projected to decrease in upcoming decades due to greater expected mortality decreases among men than women (Statistics Sweden, 2009). This could imply that more people can expect to live longer with a spouse.

4.2 Health trends matter

Changes in life expectancy are rather easy to follow over time when valid data are available. Less is known about gender differences in health over time, especially among the oldest old people. The fact that men have “gained” more in life expectancy does not necessarily imply improvements in men’s health compared to women. “Gain” in survival can be at the “cost” of health. If more and more sick men survive into higher ages (sick survivors), will that also lead to a closing of the gender gap in morbidity? Moreover, since health late in life is mainly what drives life expectancy today, it is of particular interest to follow health trends separately for women and men. Studying gender differences in health over time might also help to get better knowledge about factors that affect health and disability in old age.

Health trends among the oldest old, which is the fastest growing sector of the population, has become of great interest in recent times, partly because of the rising costs of medical care and social services. Future demand and need of care and services will to a large extent depend on the health development among the oldest part of the population.

As men and women have different patterns of both mortality and morbidity, gender differences in health trends in the older population are of great concern, both from the perspective of the individuals and of their families. Health problems cause pain and suffering and reduce quality of life and the ability to live an independent life.

4.3 Increased life expectancy – more years of good or poor health?

As described above, average life expectancy increased considerably during the twentieth century. A consequence of the reduced mortality rates is that elderly people survive longer, which means that the association between poor health and mortality has changed over time. Old people with severe

disease (stroke, myocardial infarction) have higher survival rates than ever before (albeit often with impaired health) (Crimmins, 2004; Crimmins & Saito, 2000; Rosén & Haglund, 2005). This leads to the inevitable question: do elderly people survive only to spend the rest of their lives in poor health?

4.3.1 Hypotheses about years in good or poor health

Increased life expectancy raises several questions. One of them is whether the years added to life consist of years in relatively good health and independence or in poor health with functional impairments and care and service needs (Parker & Thorslund, 2007). The changing association between increased life expectancy and health status has been vividly discussed and has generated three primary hypotheses. One of the reasons why the association between life expectancy and health status has caused a debate is because it is possible to find empirical evidence for all hypotheses proposed in the literature.

4.3.1.1 Compression of morbidity

The compression of morbidity hypothesis, originally introduced by James Fries (1980, 1983, 1986), suggests that improved living conditions and healthier lifestyles lead to a postponement of the onset of chronic disease to higher ages. According to the original version, humankind has a genetically determined biological maximum age. Thus, morbidity would then be “compressed” into the last years of life.

Because of the constantly increasing mean life expectancy in most countries (Christensen, et al., 2009; Oeppen & Vaupel, 2002), Fries refined his original theory, without the assumption of a biological maximum age. In this version, declines in morbidity are greater than increases in life expectancy. This hypothesis implies that future resource needs per capita will decrease, since the overall morbidity in the population will decrease, as will the need for care and services, and the period of dependency will become shorter (Fries, 2003).

4.3.1.2 Expansion of morbidity

According to the expansion of morbidity hypothesis, medical advancements lead to a higher proportion of people in poor health surviving with their health problems into advanced age (Gruenberg, 1977; Olshansky et al., 1991). That is, years in good health without disability remain more or less unchanged despite increased life expectancy. The years added to life consist of years in poor health and disability. This leads to the so-called medical paradox, suggesting that as more lives are saved with medical intervention, there are higher rates of health problems in the population. Expansion of morbidity would imply a greater need for care resources per capita.

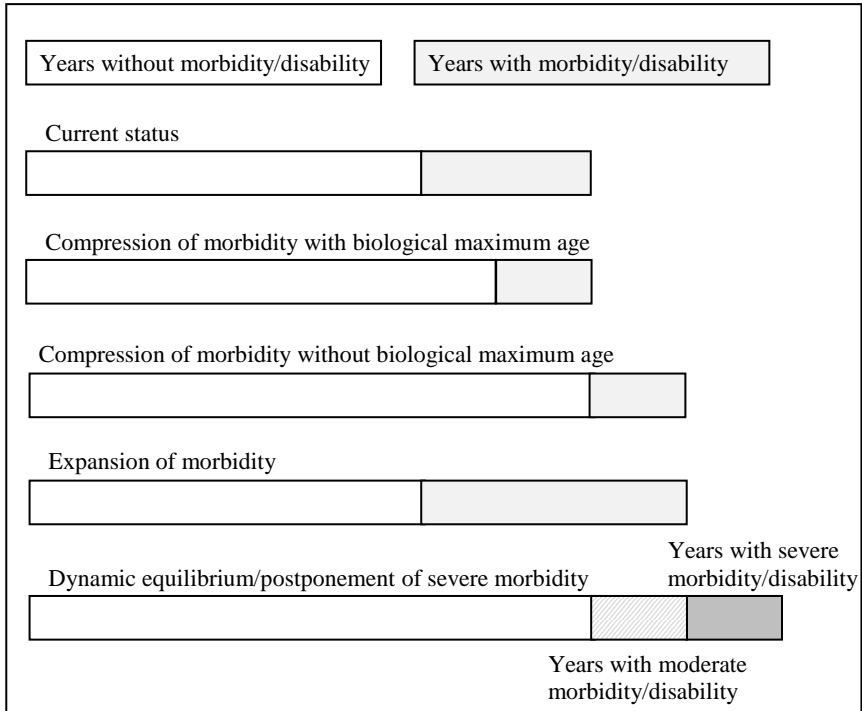


Figure 4.3. Hypotheses about the relation of mortality and morbidity/disability

4.3.1.3 Dynamic equilibrium – postponement of severe morbidity

The hypothesis of dynamic equilibrium (sometimes also referred to as postponement of severe morbidity) proposes that the proportion of years spent in poor health and disability will remain more or less constant as life expectancy increases (Manton, 1982). Improvements in both medical treatment and lifestyle will slow down the progression of chronic disease. For example, the increase of surgical interventions (cataract, knee, and hip joint), even at high ages, may have improved functional ability among groups in the elderly population. As a result the years added to life consist of both healthy years and years of moderate and severe morbidity/disability.

4.4 Both improved and worsened health – mixed trends

4.4.1 Positive trends from 1970 to the mid-1990s – thereafter unclear

During the 1970s, 1980s, and early 1990s, many studies showed improvements in a number of health measures. One of the first epidemiological studies of older people, the Gerontological and Geriatric Population Study in Gothenburg, also known as H-70, showed improvements in diseases, symptoms, and physical function among 70-year-old persons living in the 1970s (Wilhelmson et al., 2002). Results from the Swedish Level of Living Survey (ULF) (ages 65–84) also showed improvements in most measures of health, physical function, and disability between 1980 and the middle of the 1990s (G. Persson et al., 2001).

Most of the health trend studies during this period used health indicators based on physical function and disability. The general trend between 1980 and the early 1990s was improvements in physical function and disability, both in Sweden and many other countries (Ahacic et al., 2000; Freedman et al., 2002; Manton & Gu, 2001; Rosén & Haglund, 2005).

Since the 1990s, both international and Swedish studies of health trends among elderly populations have shown diverging, and even conflicting, results. Several components of health and disability have followed different trends over time. While disability measures (ADL and IADL), often showed no change or improvement over time, there was a simultaneous increase in chronic disease and functional impairment (Crimmins, 2004; Freedman & Martin, 2000; Freedman, et al., 2002; Freedman et al., 2007; Jacobzone et al., 2000; Kramarow et al., 2007; Parker et al., 2005; Parker & Thorslund, 2007; Robine & Michel, 2004; Spillman, 2004; Wolf et al., 2005). If these trends originating in the mid-1990s continue, they will imply future needs for medical care that are greater than expected, while needs for social services may be smaller than expected.

Analyses of the Swedish Level of Living Survey (SWEOLD) showed an increase in the prevalence of several health problems among very old people between 1992 and 2002 (Parker, et al., 2005). The increases in just one decade of health problems, both reported disease and symptoms as well as objective tests of functional ability, raise the question of whether these changes are due to structural changes (environment, threshold to institutions, educational level, and behavioral factors). Exploratory analysis of the SWEOLD data for possible causes of the health declines between 1992 and 2002 revealed that the worsening could not be explained by changes in age and sex composition, different smoking habits, drinking habits, change in economic

resources, nervous and sleeping problems, earlier work situations, socioeconomic positions, nonresponse rates, or study design. Other possible factors that might have affected the health declines are changing associations between health and control variables between 1992 and 2002 (the association between health and socioeconomic position), changes in survival patterns, and effects of the large cutbacks in Swedish health care, old-age care, and welfare policy during the 1990s. The cutbacks in the old-age care and the welfare policy might not have affected the oldest old to the same degree that it affected their younger counterparts (Kåreholt et al., 2004).

A study of functional ability (walking and running ability, vision and hearing, and disability) covering the whole time period from 1980 to 2005 based on the ULF data demonstrated that different function indicators showed different trends over time. Seen over the 25-year time period, mobility items (running, walking) and disability indicators showed improvement. However, these improvements occurred during the 1980s and early 1990s. After the mid-1990s, the positive development ceased, and in some cases there were considerable increases in problems (Parker et al., 2008).

4.4.2 Compression and expansion of morbidity – why diverging results?

A great deal of the confusion between different health trend studies might have to do with methodological issues, such as representativeness and the use of different health and function indicators, as well as changes in contextual factors and reporting.

The positive trends in morbidity and disability that were reported between the 1970s and early 1990s gave support to the compression and postponement of morbidity hypotheses (Cutler, 2001; Lagergren & Batljan, 2000; Manton et al., 1997). It has been shown that health trends depend on the choice of health indicators (Brønnum-Hansen, 2005; Parker & Thorslund, 2007). Many of the earlier studies did not differentiate between morbidity and disability, which reflect different dimensions of health and may show different trends over time.

Other factors that might affect results between studies are differing age ceilings, nonresponse rates, and strategies regarding the inclusion of persons living in institutions. As older members of the population in general – and elderly nonrespondents and institutionalized people in particular – report more disease and health problems, the exclusion of the oldest old will likely lead to an underestimation of health problems in health studies among older people. Since the threshold for access to institutions changes over time according to changes in policy and priorities, an exclusion of institutionalized

persons would affect the prevalence of health problems in the elderly population.

4.4.3 The gender gap in health among the oldest old people: getting bigger or smaller?

The association between mortality and morbidity has changed during the last decade. The survival of very frail people has increased considerably (Rosén & Haglund, 2005), and this is especially pronounced among elderly men (Crimmins & Saito, 2000). Meinow (2008) showed that the increase in survival between 1992 and 2002 in Sweden was primarily due to increased survival among very frail elderly men.

Compared to the gender differences in mortality and life expectancy, the patterns of gender difference in healthy life expectancy (the average number of years expect to live with a given health condition within total life expectancy) are less evident (Jagger et al., 2008). The methodological issues mentioned above will also influence studies of gender differences in health over time. Studies from the U.S. have shown that the years added to life generally consist of healthy years for men, while for women, the increase in life expectancy seems to consist of years with functional disability (Bird & Rieker, 2008; Crimmins et al., 2002).

Sweden, as many other countries, has experienced great changes in gender roles. Some of the improvements in men's IADL disability (preparing food and doing laundry) may be explained by men's greater ability to perform activities that traditionally have been the women's domain. ADL (toileting, dressing, eating) on the other hand, are probably less influenced by changes in gender roles.

5 Gender equity in the utilization of care services

5.1 The objectives of care services – equal access for equal need

Access to care is often emphasized in the political context. In recent years, the importance of gender has grown in social policy discussions regarding health and social care services. The main reason for this is that gender equality is an all-embracing goal from a political perspective. According to the National Board of Health and Welfare (2008, p. 14) this means that “men and women, according to their specific, and sometimes different, needs shall be given equal possibilities to gain the best health and living conditions possible through equal access to health and social care.”

The overarching objective of the Swedish welfare system is good health for the entire population. A fundamental principle, explicitly supported by legislation, is to provide services – “equal access for equal need” – irrespective of sex, age, socioeconomic position, ethnicity, and geographical location. This principle is evident in legislation regarding dental, medical, and social services (Dental Care Act, SFS 1985:125; Health and Medical Services Act, SFS 1982:763; Social Services Act, SFS 2001:453). Another explicit objective is to reduce *inequalities* in health and health-care utilization among groups (Gillström, 2001; National Board of Health and Welfare, 2008, 2009b).

Discrepancies exist in the legislation, however, with consequences for individuals and their relatives as well as for the system. The Health and Medical Services Act, for example, allows priority to be given to those with the greatest need for care, and further, that the individual’s need be met within the economic frame of the commissioning authority. The Social Services Act, on the other hand, has an important addition, the condition that the individual must fulfill the criteria “if the need cannot be met in any other way.” According to the Social Services Act, the individual has the right to appeal a decision in an administrative court. Another crucial discrepancy in the legislation is the field of responsibility division: the 290 municipalities (kommuner) are responsible for providing social services, while the 20 county

councils (landsting) and four regions are responsible for health care. Yet the division is not clear-cut for old-age care. Municipalities are responsible for special housing, including nursing homes that require medical care.

Moreover, the legislation consists of so-called “framework laws”, which are vague and rather broad, and they do not give much guidance to politicians or municipal and county-council officials in designing health and social care services. Nor does the legislation provide guidelines for communication and collaboration between municipal and county providers.

5.2 Fair care – inequality and inequity regarding utilization of care services

The terms inequality and inequity are commonly used in social policy and in the context of health and the utilization of care services. In brief, the notion of inequality regarding health and use of care services is descriptive and refers to observable differences between individuals or groups (between women and men, and social groups). These inequalities, in turn, might be considered unfair, which leads to inequity (Wamala & Lynch, 2002).

The main principle, in the Health and Medical Services Act, of equal access for equal need is often divided into the concepts of horizontal and vertical equity. Horizontal equity means that persons in equal need should be treated equally. Vertical equity implies that persons with greater needs should be prioritized over those with lesser needs (Culyer & Wagstaff, 1993). These concepts are not explicitly outlined in the legislation.

Another aspect of fair care is health literacy. Health literacy refers to a person’s ability to understand information regarding care and social services, how factors affect health, and how to navigate in the care systems. That is, two persons with equal need may have different circumstances and competencies for actually accessing care services. To reach the goal of equal access for equal need, persons with a low level of health literacy might need more health care intervention (Burström, 2010; Rudd et al., 1999).

Health literacy might differ for women and men. In their landmark paper, Hibbard and Pope (1986) proposed that women and men differ in how they perceive, evaluate, and act in regard to symptoms of disease. Due to their reproductive role, lactation, menstruation, and menopause, women may have become more observant and aware of bodily cues and changes than men. They also argued that it is more socially acceptable for women to admit illness, discuss symptoms, and seek care.

5.3 Factors affecting utilization of care services

Care visits depend not only on an individual's objective and subjective needs. Care visits reflect how accessible the care form is, both economically and physically. They also reflect differences in knowledge and awareness about the kind of care available.

The Andersen Behavioral Model of the use of health services, originally developed over 40 years ago, provides a multidisciplinary conceptual framework for health service use (Andersen, 1995). This model differentiates between three generic variables that may explain utilization of care services: need factors, enabling factors, and predisposing factors.

- Need factors refer to subjective and objective evaluations (by the individual or by a care provider) of an individual's health status, symptoms, and functional capacity.
- Enabling factors include conditions that support or hamper the use of care services when they are needed, such as economy, family, social support, and availability of services.
- Predisposing factors refer to individual characteristics, such as demographic factors (age, gender, and marital status), social structure (occupation and education), knowledge, and attitudes. These factors influence the propensity to use and seek health services.

There is, however, no clear-cut differentiation between these three factors; rather, they overlap and interact with each other. For example, age (predisposing) is associated with more health problems (need) and therefore associated with care utilization. A spouse or social support may help to detect health problems, encourage the seeking of care, and give instrumental support (transport, phone calls) – that is, both enabling and predisposing characteristics. Education is associated with better health, but can also influence an individual's aspirations, awareness, and knowledge regarding both health and care services.

How the care system is organized can also have an effect on the utilization of care services. For example, patient fees, shortage of providers, as well as geographical distances might have a restrictive effect regarding access to care services. Moreover, care-service types may be driven to varying extents by the factors included in the Andersen model, and these factors may affect women and men differently. Physician visits most often indicate a health problem (medical need), while dental visits are more likely to be influenced by enabling factors (economy) and predisposing factors (health behavior and

habits) (Andersen, 1995; Gilbert et al., 2003). Dental visits are also seen as a preventive measure to a higher degree.

Most care services involve some kind of gatekeeper. For example, an applicant's need for old-age care (home help or special housing) is assessed by a municipal care manager (biståndshandläggare), nurses usually screen persons requesting an appointment with a physician, physicians are responsible for prescribing particular drugs, and a nurse or a physiotherapist is involved in functional training and the provision of assistive technology. It is common that family members are engaged in this process, particularly among elderly people. A child or a spouse may initiate and provide support in the care-seeking process. Larsson and colleagues demonstrated that coresiding older people who received informal care also had greater chances of receiving home help or moving to institutional care (Larsson et al., 2004; Larsson et al., 2006).

Age and gender may influence the behavior of gatekeepers, positively and negatively. Gatekeepers' perceptions, beliefs, and attitudes about older persons may influence their evaluation of the need and the intervention or treatment that is appropriate. It has, for example, been shown that men are more often prescribed newer and more expensive drugs (Johnell et al., 2009).

5.3.1 How does gender affect services and care utilization?

Research on patterns in health care utilization has shown that different factors predict care utilization for women and men. Today, there are about 25 percent more women than men in Sweden aged 65 and older, and the numerical gender difference increases with age, so that by 85 years and older there are more than twice as many women as men (Statistics Sweden, 2010). A consequence of their longer life span is that women are more likely to live without a spouse during the last years of life. Women also tend to marry men who are older than themselves and are less likely to remarry in old age than men, further increasing the proportion of women living alone.

The fact that women are more likely to be widows and to live without a spouse when becoming frail during the last years of life makes them more dependent on help and support from outside their households, that is, from relatives or old-age care, while a vast majority of old men are cohabiting during the end of life. That is, elderly men are more likely to receive informal care, most often provided by their wives, while elderly women generally are the recipients of formal care (Larsson & Silverstein, 2004; Larsson & Thorslund, 2006; Statistics Sweden, 2005; Szebehely, 2005).

Being married or cohabiting has been shown to be positively associated with health care utilization for men but not for women. Men's care seeking behavior seems to be highly influenced by women with whom they are living (Parslow et al., 2004).

Living alone is associated with the use of both formal and informal (supplied by families, friends, and neighbors) social care. Since older women are more likely to live alone when becoming disabled, they also have a higher probability of getting into an institution. Controlling for living alone, the gender differences in institutional living among elderly people are substantially reduced. Social variables, such as household composition and marital status, which serve as proxies for accessibility of informal care, are stronger determinants of institutional care than gender or age (Arber & Cooper, 1999; Larsson, 2004).

5.4 Different care services

The utilization of care services is driven by a complex pattern that involves characteristics of the care-seeking individual – like health and function (need), propensity to seek help (predisposing factors), and opportunities and resources for seeking help (enabling factors) – as well as the influence of family members and care providers. This complex interplay of forces driving utilization differs by kind of care and may affect women and men differently. The factors that influence the use of physician visits may differ from those that drive the use of dental visits or use of municipal home help. It has been shown that women (16–84 years) are more likely to forego medical care than men, even though they feel they need it (Statistics Sweden, 2006a), and that economically vulnerable women (18–75 years) to a higher extent than men refrain from seeking dental care as a consequence of patient fees (Gillström, 2001). In Study III of this thesis, the focus was on gender differences in care utilization among very old persons in regard to visits to the physician and dentist.

As shown in chapter 3, gender differences in health and disability are well documented. Therefore, it is likely that gender's impact on utilization varies by care form. Comparing types of care services will enrich the understanding of the sources of gender variation in care-service utilization and the mechanisms that underlie them.

5.4.1 Medical care

Before 1970 there were great variations in the supply of health care in Sweden. There was no uniform health-care system. For example, there were substantial variations in patient fees, and patients could not foresee the cost. In 1970, a major health reform was accomplished to eliminate economic barriers regarding health care, the aim of which was fair care. The patient fees were set to a fixed sum, irrespective of the actual cost or the treatment given. Another aim was to attain a more uniform system to facilitate the expansion of primary care. Since the 1970s, patient fees have more than doubled (related to retail prices), with the largest increase made during the 1980s (Gillström, 2001).

Today, when elderly people seek medical care, they most often go to a county primary-care center for an appointment with a general practitioner. At these facilities, a nurse often functions as a gatekeeper. In 2002 (the year studied in Study III), the ordinary patient fee for such visits was set to SEK 150, a cost known before the visit. Additionally, there is a high-cost ceiling. In 2002, if a patient exceeded the amount of SEK 900 during one year she or he had the right to free medical care from the date of the first visit until 12 months had passed.

Despite the high rates of care utilization in the elderly population, surprisingly little research has focused on gender differences in the fastest growing sector of the population – the oldest old – that is dominated by women (Bird et al., 2002). It is often proposed that women make greater use of care services than men in all ages. However, this does not seem to be persistent for all ages and for all types of care services.

Previous research has shown that women have overall higher care service utilization than men in the general older population, but this gender difference tends to be less for more serious health conditions. Furthermore, older women are more likely to use preventive care and primary care, while older men have more hospital admissions (Bertakis et al., 2000; Dunlop et al., 2002; Juel & Christensen, 2008; Waldron, 1983; Verbrugge & Wingard, 1987).

Studies that have examined gender differences in physician visits, and have included older people, have found diminishing gender differences with increasing age, despite the fact that older women generally report more health problems than older men (Cameron et al., 2010; Ladwig et al., 2000; National Board of Health and Welfare, 2009b; Suominen-Taipale et al., 2006).

5.4.2 Dental care

Dental care is not included in the Swedish universal care services system. The Swedish dental health system has undergone extensive changes over the years. Changes in dental care provide a good example on how public health care interventions have affected health outcomes. Both treatment, and neglect of treatment, is reflected in different cohorts' dental health statuses. (Ahacic, 2002).

In 1974, a major dental care reform was enacted. The aim was twofold: to expand public dental care, restricted as it was by a shortage of dentists, and to reduce differences in dental health and dental care utilization due to social class by lowering patient fees (making care free of charge for children up to 19 years old). The subsidies were then lowered stepwise, and expired in the late 1990s. A high cost protection for people aged 65 years and older was introduced in 2002, and in 2008 a further dental care reform emerged. This reform introduced a general dental-care allowance (in addition to the high cost ceiling). The annual allowance is SEK 600 for people aged 20–29 years and 75 years and older, and SEK 300 for people aged 30–74 years.

A dental visit, in contrast to visits to county primary care, has no fixed costs. The patient does not know the cost before the dental visit; rather, the fee is set after the examination. There is a high-cost ceiling, but at a substantially higher level than for medical care and social services. Over the course of one year, the patient gets a 50 percent discount on costs over SEK 3,000 and an 85 percent discount on costs over SEK 15,000. Also, in contrast to health care and old-age care, there are no gatekeepers who control access to dental care. Patients book their visits directly, whenever they feel the need. It is also more common that a dental visit is made as a preventive measure; that is, many people have regular checkups.

There have been considerable improvements in the adult population's dental health status in Sweden in the last 40 years. There have been great decreases in edentulousness, and more and more people have teeth in good condition. In the older population there has been an increase in the number of persons that have teeth with many fillings, crowns, or bridges. As both the proportion of older persons in the population and the proportion of persons with their own teeth increases, future needs for dental care will also most likely increase (Ahacic, 2002; National Board of Health and Welfare, 2009a).

Very few studies, national or international, have examined gender differences in dental care utilization among older people. A study from the National Swedish Social Insurance Board (Riksförsäkringsverket) showed that women had somewhat higher dental care utilization in the general population

(20–84 years) in 1998 and 2002. This analysis did not examine gender differences in utilization in varied age groups. Exploratory analysis of data from Statistics Sweden’s annual Living Conditions Survey (ULF), 2005–2007, and LNU/SWEOLD 1991/1992 and 2000/2001 (figure 5.1) revealed that women had slightly higher rates of dental visits in younger ages, but that this gender difference decreased with age, and in the highest age groups, men had more dental visits.

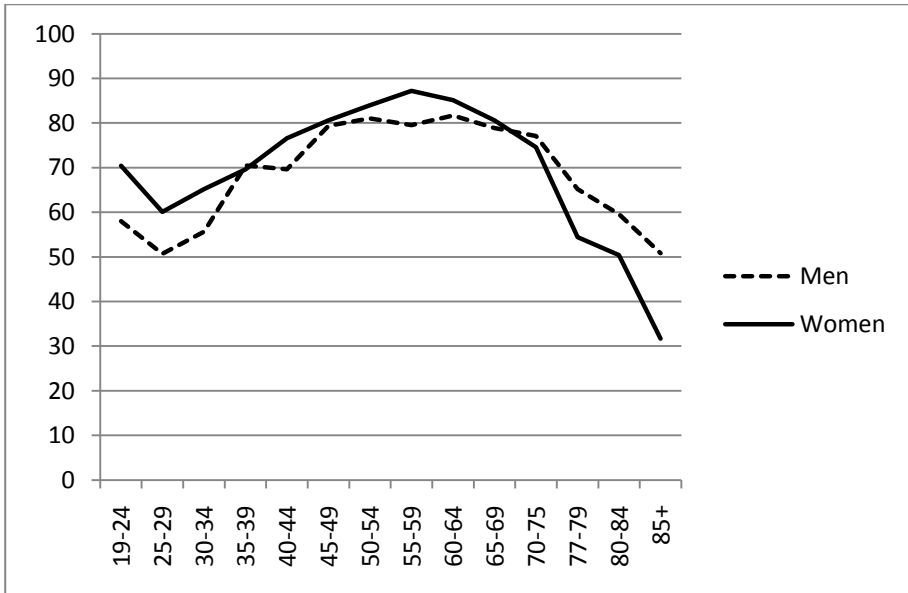


Figure 5.1. Dental visits LNU 2000 and SWEOLD 2002. Percentages.

6 Material and methods

6.1 Data

Two surveys (LNU and SWEOLD) and mortality data provided by Statistics Sweden were used in the studies included in this thesis. In Study I and Study II, data from the SWEOLD survey waves of 1992 and 2002 were analyzed. Study III used data from the SWEOLD survey of 2002. Study IV was based on the LNU survey waves of 1991 and 2000, and the SWEOLD survey waves of 1992 and 2002, combined with mortality data from Statistics Sweden for the four respective survey years.

6.1.1 The Swedish Level of Living Survey

The Swedish Level of Living Survey (LNU) is a multipurpose nationally representative sociological panel interview survey with the aim of studying the distribution of welfare in Sweden in a broad sense. LNU was first conducted in 1968 (Erikson & Åberg, 1987). Thereafter, follow-ups were carried out in 1974, 1981, 1991, and 2000. Right now a sixth wave is being carried out in 2010 and 2011. The baseline survey in 1968 consisted of about 6,000 randomly selected persons in the age range 15–75 years. In 1991 the lower age limit was raised to 18 years, while the age ceiling of 75 years was maintained. In order to preserve a representative sample, younger people and immigrants were added over the years. Between 1968 and 2000 the response rate varied between 91 percent in 1968 and 77 percent in 2000. In the running survey waves people dropped out from the panel when turning 76 years of age.

6.1.2 The Swedish Panel Study of Living Conditions of the Oldest Old

The Swedish Panel Study of Living Conditions of the Oldest Old (SWEOLD) is an extension of LNU. SWEOLD was established in order to follow those LNU participants who had passed the age ceiling of 75, with the purpose of maintaining a level-of-living survey that included the oldest sector of the population. In 1992 ($n = 537$), all persons who had turned 75 years and had participated in at least one of the LNU survey waves were traced. Subsequent survey waves were carried out in 2002 ($n = 621$) and

2004 (n = 1180). In 2004 the interviews were conducted by telephone, and the lower age limit was lowered to 69 years. The nonresponse rates were 4.6 percent in 1992, 11.5 percent in 2002, and 7.8 percent in 2004. Adding the nonresponse figures from LNU, the effective nonresponse rate for comparison to the nationally representative sample was 11.1 percent in SWEOLD in 1992 (O. Lundberg & Thorslund, 1996).

Professional interviewers carried out structured interviews with the respondents. Institutionalized persons were included. Most of the interviews were direct visits, conducted face-to-face in the respondent's home. Telephone interviews were carried out when necessary, primarily due to reluctance to receive an interviewer in the home. If the respondent could not be interviewed (because of severe illness or cognitive impairment), proxy interviews were performed with a close relative or nursing staff. Distribution of interview mode changed only slightly between the survey years. Age and sex distribution and the proportion of persons living in institutions in the total sample reflect national averages at each time of measurement (O. Lundberg & Thorslund, 1996).

Both LNU and SWEOLD include questions about living conditions (economy, living arrangements, social relations, leisure activities, and political resources). In order to "gerontologize" SWEOLD, working-life-related questions from LNU were reduced in favor of a range of questions relevant for the oldest population (indicators of health and disability, use of care and social services, tests of physical function). Since each wave of LNU and SWEOLD is nationally representative, the data can be used for cross-sectional analyses. SWEOLD was used in all studies in the present thesis. Study IV also included some age groups (65–75 years) from LNU.

6.2 Measurements

6.2.1 Indicators of health and disability

Different types of health indicators, both self-reported and "objective" tests, were used in the four studies included in this thesis. These indicators were used both as outcome variables as well as independent variables depending on the specific purpose.

In Study I, gender differences in health and their change over time were analyzed using a wide range of health indicators. Eleven self-reported health problems (single indicators) were included: *global self-rated health, leg ulcers, diabetes, myocardial infarction, hypertension, depression, sleeplessness,*

general fatigue, musculoskeletal pain, hearing, and mobility; two self-reported measures of disability were included: *IADL* and *ADL*. In addition to these, four objective tests were included: *physical performance, peak flow, cognition, and vision*.

Study II examined gender differences in the association between disability, as measured by *ADL, IADL, and other health indicators*, and the change over time in these associations. Thus, dependent variables were *ADL and IADL*. Independent variables included objective tests of *performance and peak flow* as well as the self-reported measures, *global self-rated health, mobility, musculoskeletal pain, psychological problems, and fatigue*.

Study III explored gender differences in care utilization in terms of visits to the physician and dentist by community-dwelling people of the oldest old sector. Dependent variables were self-reported *physician visits and dental visits*. Independent variables were *civil status, education, cash margin* (a measure of economic resources), *mobility, health status, and dental status*.

In Study IV, gender differences in the proportion of healthy years, measured as years free from self-reported *musculoskeletal pain* in relation to life expectancy at 65 in 1992 and 2002, were described.

6.2.1.1 Self-reported indicators

Global self-rated health (SRH) is a subjective measure of a person's overall health, reflecting dimensions of health that are important to each individual. This means the dimensions of health that SRH reflects for each person may differ. However, this straightforward and simple health indicator has shown to be a stable and good predictor of mortality (Idler & Benyamini, 1997; Idler et al., 1999; O. Lundberg & Manderbacka, 1996). SRH was obtained by a single question: *How do you view your general state of health?* Alternative responses were: *Good, In-between, or Poor*. Good SRH was coded as no problems, in-between as mild, and poor as severe problems in both Study I and Study II. SRH was used as an outcome variable in Study I, and as an independent variable in Study II.

Some of the outcome variables in Study I (leg ulcers, diabetes, myocardial infarction, hypertension, depression, sleeplessness, and fatigue) were taken from a list, headed by the question: *Have you had any of the following diseases or disorders during the last 12 months?* Alternative answers were: *No; Yes, mild problems; or Yes, severe problems*. Common Swedish expressions for respective medical conditions were used in the interviews.

Musculoskeletal pain was an index of pain in shoulders, back, hip or sciatica, hands, elbows, legs, or knees. In Study I, where the index was studied as an

outcome variable, it was divided into three categories: no pain, one or two mild pains, and at least one severe pain. In Study II and Study IV, the index was dichotomized, to differentiate between those with at least three mild problems or one severe problem from those with lower scores. Musculoskeletal pain was used as an independent variable in Study II and as the pain measure when pain-free life expectancy was analyzed in Study IV.

Hearing problems was a dichotomous (yes or no) variable, based on the respondent's reported ability to hear a conversation between several persons without difficulty, with or without a hearing aid (outcome variable Study I).

Mobility was an index of four items regarding the ability to walk 100 meters, climb stairs, rise from a chair without problems, and stand without support. In Study I, where mobility was studied as an outcome variable, one limitation was considered to be mild problems, more than one limitation was considered severe. In Study II and Study III, the mobility index was used as an independent variable and was dichotomized; limitations with one or more of the items were coded as having impaired mobility.

ADL and IADL were used as outcome variables in Study I and Study II. ADL consisted of five basic self-care items: eating, toileting, dressing, transferring in and out of bed, and bathing. IADL, which measure the activities necessary for living in the community, were included only for community dwelling persons. Respondents were asked if they usually cleaned house, shopped for food, and prepared food without help. Those who reported having help were then asked if they were able to do these activities if necessary. One limitation was considered mild problems, and more than one limitation was considered severe. IADL questions were not answered by respondents living in institutions. Due to the different purposes of Study I and Study II, IADL was treated differently in regard to persons living in institutions. In Study I, which focused on gender differences in health and changes over time, the analysis of IADL excluded persons living in institutions. In Study II, which focused on associations between ADL, IADL, and other health indicators, persons living in institutions were rated as disabled on all IADL items. IADL tasks are even more demanding than the ADL tasks. Exploratory analysis (not shown) revealed that 95 percent of the persons living in institutions were disabled in at least two of the ADL tasks. Therefore it is reasonable to assume that people in institutions have IADL limitations.

Psychological problems (independent variable in Study II) were measured by an index based on five psychological items: general fatigue, sleeping problems, nervous problems (anxiety), depression, and mental illness. Respondents that reported at least two mild problems or one severe problem were considered to have psychological problems. Similar indices have been used

in earlier studies (Fors, 2007; Fritzell & Lundberg, 2007; Thorslund & Lundberg, 1994) and have been shown to predict mortality (O. Lundberg, 1990).

The fatigue index (independent variable in Study II) summarized five items concerning tiredness. Four of them – tiredness during the last 14 days, trouble getting started in the morning, remarkably tired in the daytime, and quite exhausted in the evenings – had yes or no answers. The fifth item in the index concerned overall fatigue during the past 12 months. Respondents reporting two or more problems were regarded as having problems with fatigue.

Health status (independent variable in Study III) was measured by an index based on 18 self-reported symptoms and diseases. Respondents were asked whether they had experienced any of the diseases during the past 12 months. Possible answers were: *No*; *Yes, mild problems*; or *Yes, severe problems*. The summarized index was dichotomized; one severe or three slight problems or more was considered as poor health status.

Dental status (independent variable in Study III) was measured by the question: *Which of the following statements best describes your teeth?* The respondent was shown a card with following response alternatives:

1. No teeth or roots only
2. Dentures, complete or partial
3. Own teeth, in poor condition: many missing, etc.
4. Own teeth, in good condition; no or few fillings

The categories 1 (no teeth roots only) and 2 (dentures, complete or partial) were collapsed in the analyses.

6.2.1.2 Objective tests

Performance was the name of an index constructed of nine simple tests encompassing range of motion, balance, strength, and hand function. Each test was first demonstrated by the interviewer, and then the interviewer asked the respondent to pick up a pen from the floor, touch opposite toes, lift one kilogram, or rise from a chair. Those who could not perform a test without problems were classified as having failed the test. A respondent who failed one or two tests was considered to have mild problems, and failing three or more tests was considered severe. The performance index was studied as an outcome variable in Study I and as an independent variable in Study II.

Peak expiratory flow is a simple test of lung capacity. The participant was tested three times, and the best score was analyzed. As lung capacity is highly dependent on height, the residual from a regression model where height

was regressed against the peak flow value was used as the outcome measure. Similar procedures were carried out and used empirically in several studies (Ahacic et al., 2007; Cook et al., 1995; Cook et al., 1991). In Study I, where peak flow was studied as an outcome variable, less than one standard deviation below the mean was considered severe, rates between this point and the mean were considered mild, and rates at or above the mean were considered no problem. In Study II, peak flow was used as an independent variable and was dichotomized to differentiate those with severe problems from those with higher scores.

Cognition was tested with a short form of the established Folstein Mini-Mental State Examination (Folstein et al., 1975). This abridged version consists of five items: *registration* (repeating three named objects), *orientation to time and place* (year, month, and date), *recall* (repeat the three objects in the registration task), *attention, concentration, calculation* (subtracting 7 from 100 five times to get 93, 86, 79, 72, and 65), and *visual-spatial ability* (drawing a figure shown). Cutoff points for mild and severe cognitive impairment were found using the corresponding items in larger Swedish studies (Gatz et al., 2005; Palmer et al., 2002) that included the entire Mini-Mental State Examination as well as clinical diagnoses of dementia (Parker et al., 1996).

Vision was tested by asking the participants to read the instructions on a medicine bottle with or without glasses. Because literacy in Sweden is very high (even in the oldest age groups), it is reasonable to consider this as a test of vision and not of reading ability. Reading incorrectly or with difficulty was considered mild impairment, and total inability to read was considered severe.

6.2.2 Indicators of care utilization

Care utilization was based on self-reported information. Physician visits were based on the question: Have you at any time during the past 12 months consulted a doctor about your own diseases and disorders? Consultations during a hospital stay were not included.

Dental visits were obtained by the question: Have you visited a dentist during the past 12 months? Alternative responses were yes or no for both physician visits and dental visits.

7 Overview of the studies

7.1 Study I: Sex differences in health in 1992 and 2002 among very old Swedes

Despite their longer lives, women show higher morbidity rates compared to men at all ages. In recent decades the gender gap in mortality has narrowed due to men's greater "gains" in life expectancy. However, this does not necessarily entail improvements in men's health compared to women. Few studies have examined sex differences in morbidity over time among the oldest old.

Objectives

To describe sex differences in health in 1992 and 2002 in two representative samples of the Swedish population aged 77 or older, and to examine changes in the sex differences between the survey years.

Methods

The analyses were based on the Swedish Panel Study of the Living Conditions of the Oldest Old (SWEOLD) surveys conducted in 1992 ($n = 537$) and 2002 ($n = 561$) and comprised a representative sample of the Swedish population aged 77 and older. The analyses were cross-sectional and the data were treated as two independent samples. Outcomes included both self-reported variables of disease and function, as well as objective tests of cognition, vision, lung function, and physical performance. Ordered logistic regressions were performed in order to calculate odds ratios of health problems by sex, period, and change between 1992 and 2002. Ordered logistic regression is an extension of the common logistic regression that allows for an ordered multicategorical outcome.

Results

Women, in general, had higher or similar prevalence rates of the studied health indicators compared to men. Exceptions were men's higher rates in 2002 for myocardial infarction (MI) and hearing problems. The general pattern for the change of morbidity over time, for both men and women, was increased prevalence rates for most health problems, but no change in ADL and IADL. While gender differences changed for several indicators, the interaction effect for time and gender was significant only for MI and poor glob-

al self-rated health (SRH), meaning that the development over time was different for men and women. The gender gap decreased significantly for SRH, due to men's increased reporting of poor health, and increased for MI, due to increased prevalence among men. Despite women's higher prevalence rates of problems, and their increases between survey waves, their assessments of poor SRH did not increase over time.

Conclusions

Several health indicators seem to be developing differently for men and women. During the studied period, life expectancy increased considerably, but our results provide no support for a compression of morbidity.

7.2 Study II: Gender differences in associations between ADL and other health indicators in 1992 and 2002

Studies have shown increased prevalence rates over time in several health indicators in the older population. These increases have not been accompanied by corresponding increases in ADL and IADL disability. Given that disability and other health indicators follow different trends, the associations between them may change. Since both health and disability appear to follow differing trends for men and women, we can also expect gender differences in the associations.

Objectives

To examine gender differences in the association between disability, as measured by ADL and IADL, and other health indicators, and to examine whether these associations have changed between 1992 and 2002.

Methods

The study was based on the SWEOLD surveys conducted in 1992 and 2002. The SWEOLD samples are representative of the Swedish population aged 77 years or older at each time of measurement (1992: n = 537; 2002: n = 561). SWEOLD includes both self-reported measures and objective tests of function. Because the analyses in this study included tests of physical performance, only those who were interviewed face-to-face were included. Ordered logistic regression was used for the analyses.

Results

Compared to men, women had significantly higher prevalence rates for most health indicators both survey years, but there were no significant gender differences in ADL and IADL limitations. Prevalence rates increased signif-

icantly between 1992 and 2002 for all health indicators, but not for ADL and IADL. Most of the associations between ADL/IADL and other health indicators were stronger for men than for women. The overall pattern was that associations have become weaker for women over time; for men, the picture was mixed.

Conclusions

The changing associations between ADL IADL and other health indicators may reflect a complex interplay between changes in a range of social and environmental factors, some of which may be modifiable. ADL and IADL appear to reflect different dimensions of health and different kinds of needs for social services and care for men and women.

7.3 Study III: Gender differences in visits to the physician and dentist among very old persons

The overall goal of the Swedish health care system is good physical and dental health for the entire population, according to the principle of equal access for equal need. Regarding gender equality, a number of studies have suggested that these objectives have not been fully reached.

Objectives

To explore gender differences in care utilization in terms of visits to the physician and dentist among very old people living at home.

Methods

The analyses were based on the SWEOLD survey from 2002 (n = 621). Persons living in institutions were excluded from the analysis because the factors associated with visits are different for persons living in institutions. SWEOLD comprises self-reported information on care utilization including both physician visits and dental visits during the past 12 months. Other covariates (control variables and independent variables) were sex, age, civil status, education, cash margin, mobility, and health and dental status. Logistic regression was used for the analysis.

Results

Despite women's generally poorer health status, we found no gender differences in physician visits. Despite that women showed significantly more health problems than men, there were no gender differences in physician visits during the past 12 months. For dentist visits, on the contrary, we found that men visited the dentist more often than women during the past 12 months even though, or maybe as a result of, their better dental status.

There was no effect of age on physician visits for men or women. For dental visits, on the other hand, higher age was associated with less utilization for women but not for men. Marriage was positively associated with visits to the physician and the dentist for men.

Conclusions

The results of this study suggest that there are different mechanisms behind the propensity to seek medical care versus dental care and that women may be at a disadvantage in regard to dental care. Given that women have worse health than men, they should be visiting physicians more often. Therefore, women may also be at a disadvantage regarding physician visits.

7.4 Study IV: The pains of a longer life: Gender differences in life expectancy free from musculoskeletal pain at age 65 in Sweden

The worldwide increase in life expectancy has prompted different kinds of health expectancy studies. These studies combine information on mortality and morbidity to investigate the average life years spent with (or without) different health conditions. Pain is common in the older population and is a major public health challenge. Pain is also a crucial dimension of health and has both personal and societal consequences. A growing body of research has shown substantial sex differences in the prevalence of pain and suggests that pain affects men and women differently.

Objectives

To describe the number of years spent with musculoskeletal pain in relation to total life expectancy at age 65 in 1991/1992 and 2000/2002 and to examine the change in the proportion of life expectancy spent free from musculoskeletal pain (pain-free life expectancy, PFLE) among women and men. Do the years added to life consist of years with or without musculoskeletal pain?

Methods

Musculoskeletal pain was measured by an index of pain in shoulders, back, and joints. The calculation of PFLE was made by using the Sullivan method, which combines the age-specific prevalence (proportions) of the population with or without pain, with age-specific mortality information obtained from a period life table (the probability that a person at a certain age will die within a year). The prevalence of pain was derived from the Swedish Level of Living Surveys (LNU) from 1991 and 2000, and the SWEOLD surveys from

1992 and 2002. The information on age-specific mortality was derived from period life tables for each year provided from Statistics Sweden.

The Sullivan method is the most widely used method to calculate different health expectancies. Health expectancies is the number of remaining years, at a certain age, a person is expected to live in a healthy state. Health expectancies take both changes in prevalence of a certain health problem and changes in mortality into consideration. Health expectancy is therefore useful in order to identify the interaction between good health, poor health, and mortality (Jagger et al., 2001).

Results

In 1992, life expectancy at age 65 was 15.9 years for men and 20.0 years for women; in 2002 the corresponding years were 17.2 for men and 20.6 for women. Women reported significantly more pain than men both in 1991/1992 and 2000/2002, with the exception of those aged 85+ in 1992. In 1991/1992, both men and women aged 65 could expect to live another 12 pain-free years. However, the proportion of PFLE among men (75%) and women (60%) differed significantly. Ten years later, both men and women could expect more years with pain. In 2000/2002, PFLE among women had decreased to 51 percent; among men it had decreased to 68 percent.

Conclusions

The association between pain and age seems to have changed between the survey years. Our study contributes to the debate of whether the extended years will be spent in good health or in poor health. This study also shows that PFLE provides important information on men's and women's health statuses, and provides an important dimension to the quality of life.

8 Discussion

In the light of the aging population, knowledge of disability and health status among our oldest old people as well as developments over time is crucial for future policy planning and the needs for care services. The high proportion of women to men in the expanding older population and the changing gender patterns in mortality and morbidity make it particularly important to consider gender differences in population-based gerontological research. The primary purpose of the present thesis was to describe and analyze gender differences and changes over time regarding health, physical function, and disability among the oldest old. A second purpose was to study gender differences in care utilization and correlates to utilization regarding physician and dentist visits.

8.1 Worsening of health for women and men, especially women

While many previous studies from the United States, Europe, and Sweden reported health improvements in the older population, SWEOLD was one of the first studies that showed worsened health (Parker, et al., 2005). The lack of improvement could reflect increased survival in the oldest age groups (Meinow, 2008; Rosén & Haglund, 2005). In this way, Sweden may be “ahead” of many other countries regarding population aging by being in a later stage of the epidemiological and demographical development (Parker & Thorslund, 2007; Robine & Michel, 2004).

Study I focused on gender differences in a wide range of health and disability indicators and how they have changed over time. Women generally have higher morbidity rates than men at all ages. The results of this thesis show that these gender differences in health in general persist into the oldest ages. The overall pattern found in Study I was that women had significantly higher prevalence rates in a wide range of health problems, both self-reported and in objective tests, compared to men in 1992 and 2002, but there were no gender differences in disability measures such as ADL and IADL.

Analyses of change over time showed increased prevalence rates for both women and men for most health indicators, especially for women. The in-

crease of health problems was not accompanied by corresponding increases in the prevalence of ADL and IADL limitations. Some of the health indicators showed different trends for women and men. Despite the greater increase in the prevalence rates of several health indicators for women, their reporting of poor global self-rated health (SRH) did not increase over time.

It is, however, not easy to describe changes over time in gender differences in morbidity and disability in the oldest population in a simple way. Morbidity and disability are multidimensional concepts, and health indicators capture different dimensions of morbidity and disability. The prevalence of disease and disability result from a complicated process of onset, probability of survival, and mortality rates among persons with and without health problems (Crimmins, 1996; Crimmins & Saito, 2000). Furthermore, in the different dimensions, changes over time vary. Changes are affected by factors other than physical health that also differ between the sexes. This is further complicated by the fact that the morbidity—mortality process differs between women and men.

A common explanation for women's higher morbidity rates is that there are gender differences in reporting behavior. It has been assumed that women are more prone to report illness and adopt the sick role than men, although this assumption has been challenged. Due to gender roles and their physiology (pregnancy, lactation, menstruation, and menopause) women may be more observant of bodily cues and changes and therefore identify symptoms and respond to bodily changes more readily than men do (Hibbard & Pope, 1986). Interestingly, as seen in Study I, women increased their reports of specific health problems between 1992 and 2002, and their performance on objective tests worsened, but their poor global self-rated health did not increase. This can challenge the assumption of women's over-reporting, or it may reflect the complexity of the relationship between symptoms, conditions, and global self-rated health.

The gender gap in mortality has decreased over the past 20 years in Sweden and in many other countries. Very few studies, though, have examined gender differences in disability and morbidity over time among the oldest old. As the patterns we found were mixed, it is difficult to draw definite conclusions other than that some health indicators seemed to be developing differently for women and men.

In general, the findings in the present thesis are in agreement with the international literature which also has shown mixed trends in functioning, disability, and health for women and men. A review of trends in disability and functioning (physical, cognitive, and sensory) in the older population in the United States during the late 1980s and 1990s showed both decreases and no change in trends in gender disparities depending on which indicator of func-

tion is used. There were no signs of increases in the gender differences in disability and functioning. In the cases of a narrowing gender gap, it was due to women's greater improvements (Freedman, et al., 2002). Comparisons between OECD countries showed general improvement in disability, but with some gender differences in trends in certain countries, where there was decreased disability for men while women showed either fewer decreases or increases in disability (Jacobzone, 2000).

8.2 Expansion of morbidity and compression of disability

Women live longer than men despite higher morbidity rates. Life expectancy (LE) has increased for both women and men between 1992 and 2002, but more for men. A fundamental question in gerontological research is whether the increased LE has been accompanied by a compression or expansion of periods of morbidity. Healthy LE studies provide a link between the development of population health and increasing life expectancy.

Study IV examined whether increased LE during the studied 10-year period consisted of years of good health, measured as years free from musculoskeletal pain, or if the years added to life were spent in poor health, with musculoskeletal pain. The results revealed that the estimated proportion of pain-free years at age 65 decreased for both women and men compared to the same age group 10 years previously; in other words, years in pain increased more than years added to life. These changes differed for women and men. For men, the absolute number of pain-free years remained unchanged, but years in pain increased. For women, there was both a decrease in pain-free years and an increase in years with musculoskeletal pain.

Most studies show that musculoskeletal pain is more common among women than men (Fillingim et al., 2009). Healthy LE in regard to musculoskeletal pain has to our knowledge never been studied before. Most research on healthy LE has focused on life with and without disability. In general, estimates of life with and without disability show that women's longer life spans consist of more years both with disability and without disability (Crimmins, et al., 2002).

As described in 4.3.1, there are several different hypotheses regarding the association between mortality and morbidity and disability (Fries, 1980, 1983, 1986; Gruenberg, 1977; Manton, 1982; Olshansky, et al., 1991). Many previous studies of health trends in older populations have suggested a compression of morbidity. These studies have predominantly used health indicators based on disability, most often measured as ADL and IADL limitations.

As disability is a contextually embedded concept, it also reflects environmental improvements.

The results from Study I, Study II, and Study IV, suggest an expansion of health problems in regard to diseases, symptoms, and objective tests of physical function in the oldest Swedish population between 1992 and 2002. Additionally, the results from Study I and Study II also revealed a compression of disability. Both Swedish and international studies that have included the oldest old members of the population and used different health indicators point to an expansion of health problems (symptoms and diseases) in the elderly population in the 1990s (Crimmins, 2004; Crimmins & Beltrán-Sánchez, 2011; Parker & Thorslund, 2007; Rosén & Haglund, 2005).

Descriptive studies of single health indicators among the oldest old are important from a methodological standpoint and in regard to the policy implications of prevalence rates and trends. The findings of Study I and Study IV have several potential implications for health trend studies and the field of social work (for future needs and resource allocations, social policy, and for families).

Our results reveal that we cannot assume similar health trends for women and men. Therefore, health trend studies must analyze health indicators for women and men separately. Analyses that only control for gender may miss important gender differences in trends over time. This may help us understand how behavioral, social, and contextual factors affect women's and men's health and how gender differences in disability and health arise.

The increases in several symptoms and diseases between 1992 and 2002 occurred during a period with dramatic changes in the social and health care systems. This was a period of severe economic constraints on the public sector that resulted in cutbacks and reforms. For example, the Elderly (Ädel) Reform in 1992 transferred the responsibility for institutional care and for discharged patients who still needed care from the county councils to the municipalities. Between 1992 and 2005 the number of hospital beds and treatment periods was drastically reduced (National Board of Health and Welfare, 2007). Municipalities made their guidelines more stringent and raised the threshold to old-age care. Changing social policy and access to care services may affect both "actual" health and the reporting of health problems and need for help with daily activities. For example, reports of need for help with ADL can be influenced by the individual's awareness of the ease or difficulty in getting help (Larsson, 2006).

Care of the older population is in many respects a concern for women, since women dominate both as formal and informal caregivers as well as care receivers. Since older women live longer and are more likely to live alone

when they need help, they have a greater need for formal care services. This means that younger, middle-aged, and older women are more dependent on the social and health care systems. Changes to these systems would most likely have a greater impact on the lives of women than men. If health and functioning, especially women's health, continue to worsen, this will imply a need for more social and health care resources for the oldest old.

8.3 Changing relationships between health indicators

The findings of Study I implied that the association between health indicators and ADL and IADL disability has changed over time. Study II explored these associations directly. Results showed that most of the associations between ADL and IADL disability and other health indicators were weaker for women than for men. The associations became weaker for women over time, while men showed a somewhat mixed pattern.

Both international and Swedish studies have shown increased prevalence rates of several health indicators in the elderly population, while disability measures, such as ADL and IADL, most often show no change or improvement over time. This implies that the associations between health indicators and disability change over time. A number of studies suggest that the association between diseases and disability weakened during the 1990s (Crimmins, 2004; Jagger et al., 2007; Parker, et al., 2005; Rosén & Haglund, 2005; Spillman, 2004).

Previous analyses of the SWEOLD data showed that the association between mobility and ADL became weaker between 1992 and 2002 (Ahacic, et al., 2007). A historical study from the United States (Costa, 2002) that examined data from the early 1900s to the 1990s also suggested long-term reduction in the debilitating effects of chronic conditions. Robine et al., (1998) studied data from 1981 and 1991 in France and found that the most frequent chronic conditions seemed to be less disabling in 1991. American data have shown increases in disease and chronic conditions between 1984 and 1994 among persons 70 years of age and older; at the same time, many of these conditions became less disabling over time (Crimmins & Saito, 2000; Freedman & Martin, 2000). The new contribution of Study II is that we explored the gender specificity in the association between disability and other health indicators.

Knowledge about the properties of various health indicators and the changing associations between them is important for research methodology and for practical applications such as need assessment. For example, if we only look at disability indicators, we miss the changing associations between conditions that can lead to disability.

The differences between types of health indicators are described in the International Classification of Functioning, Disability, and Health (ICF) (see 1.4). The ICF model suggests that different components of health and functioning are associated with different care needs. In short, symptoms and diseases will imply a need for medical care, while functional limitations require rehabilitation and compensatory interventions. Disability among older persons often implies a need for social services (home help services or institutional living) (WHO, 2002b).

Accordingly, our findings of increases in symptoms and diseases suggest an increased need and demand for medical care. The increases in functional limitations (as measured in the performance tests) may require rehabilitation and intervention. The fact that these conditions seem to have become less disabling over time may imply that certain environmental changes (better accessibility, access to assistive technology, and microwave ovens) may have benefited old people, allowing even people in poor health to manage daily living. If the environmental factors underlying these changes could be identified, it may be possible to further facilitate disability despite poor health and functional limitations.

Various instruments that incorporate ADL scales are often used to assess elderly people's needs for care and services. An assessment that included functional limitations and the availability, or lack, of environmental supports (elevators, walking aids, and vision and hearing aids) would provide a better assessment of what the individual needs in terms of intervention or care services.

Our results suggest that ADL and IADL reflect different dimensions of health for women and men. For example, men's stronger associations between psychological problems and IADL disability might suggest that men are more emotionally vulnerable to physical limitations. We also see that associations between ADL and other health indicators have changed in different ways for men and women. This could imply gender differences in the availability or use of interventions or that gender roles are changing.

8.4 Gender differences in care utilization

According to the Andersen Behavioral Model (described in 5.3), care utilization is the result of a multifaceted process of a person's need (health and functioning), behavior (propensity to seek care), and access (opportunities and resources) (Andersen, 1995). These three components have both individual and societal dimensions and are all influenced by gender. They also differ depending on the kind of service provided. Study III described and

analyzed gender differences in physician and dentist visits among community dwelling elderly people in 2002. Despite women's generally poorer health status, there were no gender differences in physician visits. Women had poorer dental status than men. However, men reported more dental visits compared to women (not significant after controls). Marriage was positively associated with physician visits for men and dentist visits for women.

Increasing age is associated with health problems and, therefore, obviously associated with the utilization of different kinds of care services. Many studies have shown that women have higher rates of care utilization than men in young and middle ages (Bertakis, et al., 2000; Waldron, 1983; Verbrugge & Wingard, 1987). Despite the high rates of care utilization among the oldest segment of the population, which is dominated by women, relatively little research has focused on gender differences in this group (Bird, et al., 2002; Verbrugge & Wingard, 1987).

Some studies have found decreasing gender differences in health care utilization with age, for example, in Sweden (ULF, ages 15–74) (National Board of Health and Welfare, 2009b), Germany (ages 25–69) (Ladwig, et al., 2000), and Finland and Norway (ages 65–74) (Suominen-Taipale, et al., 2006). In one of the few studies including the oldest age groups, the Health and Retirement Study in the United States (age 65+), showed no gender differences in physician visits despite older women's substantially greater health needs (defined as functional health, disability, and medical conditions) (Cameron, et al., 2010).

A Swedish study using data from Statistics Sweden (ULF, 1988/89, age 65+) found that dental visits during the past year were more common among women than men (Österberg et al., 1998). In contrast to our study, this study included younger old persons (aged 65–76) and did not analyze age groups separately. It has been shown that women have higher rates of dental care utilization among younger age groups (see chapter 5, figure 5.1).

Given women's worse health and dental status, one would expect them to visit physicians and dentists more often than men. We found no gender differences in physician visits and no gender differences in dentist visits after controlling for civil status. We could identify certain "vulnerable" groups potentially in danger of unmet care needs. Our results imply that women may be at a disadvantage regarding physician visits and unmarried men regarding both dentist and physician care. Perhaps these groups should be targeted in preventive interventions.

These results cannot necessarily be transferred to other forms of care. The access to different kinds of care services is influenced to different degrees by gatekeepers and costs to the individual and provider. The gender bias differs

in factors that influence visits to physicians and dentists, and we can assume they differ for other forms of care as well. For example, in regard to home-help services and institutionalization, Larsson et al. (2004) found clear gender differences. Women who gave care and support to their husbands were less apt to receive informal or formal care than men who cared for their wives. Accordingly, since women both live longer and tend to marry men older than themselves, they are also less likely to have a spouse to care for them in old age and more likely to need institutional care.

8.5 Methodological considerations

8.5.1 Representativity

Representativity is an important issue in prevalence-based descriptive studies of elderly people. In an ideal study (however unfeasible), the sample perfectly reflects the actual referent population, and all respondents provide complete data. In reality, all population-based studies must make compromises between internal validity and generalizability (Hardy et al., 2009). Much of the variation in health in the older population seen in studies is due to methodological differences (in regard to nonresponse, inclusion or exclusion of institutionalized and cognitively impaired individuals, handling of missing data, and age standardization) (Parker & Thorslund, 2007). Studies that have scrutinized and reexamined previous health-trend studies have shown that rather small differences in survey design and methodological changes between waves can influence results (Freedman et al., 2004; Wolf, et al., 2005).

Missing data is a special challenge and the most common potential bias in population-based studies is lack of response. Nonresponse rates generally tend to increase with age, and nonresponse at high ages has been shown to be associated with poor health and cognitive impairment (Chatfield et al., 2005; Hardy, et al., 2009). Consequently, nonresponse in old ages will often result in an underestimation of health problems. This kind of bias will be more of a problem in older age groups than younger groups.

As described in chapter 6, the Swedish Panel Study of Living Conditions of the Oldest Old (SWEOLD) (age 77+) was used in all studies in the present thesis. Study IV also included some age groups (65–75 years) from the Swedish Level of Living Survey (LNU). Both SWEOLD and LNU are based on Swedish nationally representative samples with low nonresponse rates compared to other population-based studies.

As with other surveys, nonresponse increased over time, and this increase could have led to an underestimation of poor health in later waves. If this was the case, a lower nonresponse rate in 2002 would have led to even greater increases in poor health over time.

Response patterns and, therefore, the results might also have been affected by the mode of interview (direct, proxy, and telephone). Fortunately, distribution of interview mode in the SWEOLD surveys changed only slightly between 1992 and 2002. Age and sex distribution in the samples, as well as the percentage of persons living in institutions, reflected national figures both in 1992 and 2002 (Thorslund et al., 2004)

A strength of the SWEOLD data is that both community-dwelling and institutionalized persons are included. Living alone has been shown to be a strong predictor of institutionalization. Due to the fact that women often outlive their spouses and thereby lack support from a partner, the majority living in institutions are women (Larsson, et al., 2006). Men are more likely to receive informal care from their wives in their own homes. The exclusion of persons living in institutions in studies of elderly populations will therefore lead to an underrepresentation of older women, many of whom have poor health.

Another important reason to include institutionalized persons when studying health trends in the total elderly population is that the threshold to institutional care changes over time in response to changes in policy and resource allocation.

The impact of using proxy reports in surveys of elderly people has not been fully examined. The biasing effect varies depending on type of indicator and who acts as proxy. In general, the literature supports the use of proxies in objective measures that are easy to observe, such as mobility. Subjective measures, like psychological well-being, are more questionable (Middleton et al., 2010; Neumann et al., 2000). In surveys of elderly people, the nonresponse created by excluding these disabled elderly persons may be a greater problem than the biasing effect of proxy reports (Corder et al., 1996).

8.5.2 Capturing change

One of the limitations of SWEOLD is that the data are only from two points in time (a third wave is currently in progress). There is always a risk that measures from few specific points in time could deviate from a general trend. Nor can changes in the direction of trends be identified. For example, the results of the annual Survey of Living Conditions (ULF) showed considerably health improvement in people aged 65–85 years between the 1980 and 2006 surveys. However, a closer analysis demonstrated that most of

improvements took place during the 1980s; from the mid-1990s on, there were mixed results, with some indicators showing deterioration (Parker, et al., 2008).

Prevalence rates of self-reported (or proxy-reported) health problems can reflect both “real” health changes and changes in reporting behavior. The propensity to report health problems can be affected by raised expectations and aspirations in new cohorts of elderly people, greater awareness and knowledge of health problems, and greater social acceptance of certain symptoms and diseases. For example, education levels among elderly people in 2002 were significantly higher than in 1992, which may correlate with higher expectations in regard to health. Improvements and changed thresholds in diagnostics can also have affected the reported prevalence of diseases and symptoms. There have been changes in thresholds for hypertension and diabetes, for example, over the last decades (Freedman, et al., 2007). This means that some of the increases in health problems we have seen in our studies could be related to increased reporting in 2002 or under-reporting in 1992. Since Study I and Study II include objective tests of physical function that also showed health deterioration, our results are not due solely to raised expectations or changes in reporting behavior.

8.5.3 Other concerns

The SWEOLD sample (about 1/1000 of the Swedish population aged 77 years and older) provides limited statistical power. This means that some of the gender differences in the analyses, particularly interactions between period and gender, may not have been significant due to a lack of statistical power.

The scales and questions included in SWEOLD are well established and validated, and they are combined with both established tests (peak expiratory flow, Mini-Mental State Examination) and some innovative tests of function (range of motion, balance, strength, and vision). Some of the items have been “inherited” from the original LNU questionnaire of 1968 and are less than ideal. The 1968 survey was not designed for old people, and there have been methodological advancements since then. For example, the care utilization items in 1968 required a 12-month recall for all kinds of care. Shorter recall periods for some kinds of care utilization (physician visits) would have been better. However, in an effort to preserve the longitudinal value of the surveys, the researchers chose to retain the old formulations. Another example concerns pain, an area that is ultimately subjective and so important to elderly people. There are better ways to ask about pain, but new questions could not have been easily compared to earlier answers in longitudinal analyses.

A strength of the SWEOLD data is the wide range of health indicators included, from objective tests of function to self-reports of diseases and symptoms to disability. The benefit of objective tests is that they are less sensitive to individual interpretations or expectations and less affected by environmental factors. Self-reports, on the other hand, are more influenced by expectations and aspirations, which in turn may affect the results. However, expectations have an impact on demand for care services and are therefore important for that discussion.

It is clear that the choice of health indicator depends on the purpose of the study. The findings of Study II, like those of Study I, confirm the fact that we cannot assume unchanged associations between different health indicators or unchanged gender patterns in health trends. The use of additive indices can hide a complex reality. Single health indicators included in a composite index may cover different trends over time and may differ between women and men.

8.6 Concluding remarks and recommendations for future research

Our oldest old people are the fastest growing sector of the population. The number and proportion of people over 80 years old is expected to continue increasing rapidly. Changing gender patterns in mortality rates mean that the composition of the population in regard to gender is also changing. Knowledge of health and disability trends in the aging population will provide useful information for policy makers, planners, and researchers, because these trends are likely to have implications on the demands on the Swedish welfare system (health care, social care, and social policy in general). Current health trends may also be helpful in forecasting future trends, and in turn, future needs for care services.

Descriptive studies, as included in this thesis, provide valuable information and constitute a necessary foundation for explanatory studies. Several important questions arise from the findings of this thesis. To what extent do the changing gender patterns in morbidity and disability reflect gender differences in trends in other underlying factors? To what extent are the changing associations between morbidity and disability influenced by changing gender roles? Are there gender differences in the use of assistive technology and in the benefits of housing adaptations?

One recommendation for future research in this area is to apply a life course perspective, with longitudinal analysis to examine the determinants of gender differences in health and disability and how they emerge over time and

change in different cohorts. The weakening of the link between health and disability needs further analysis and this could be done by examining gender differences in specific ADL and IADL items independently. Another question of interest is to what extent changing expectations and aspirations, as well as gender roles, contribute to the changing associations between health and disability.

Analyses of LNU data among younger age groups (19–75) between 1981 and 2000 showed increased prevalence rates for many health problems, symptoms, self-reported health, musculoskeletal pain, and psychological distress (Fritzell et al., 2007). Those in the older age groups in LNU 2000 are the future SWEOLD cohorts. At the time of completing this thesis, in the spring of 2011, a third SWEOLD survey wave is in progress, and this will include these new cohorts of older persons. Whether these people will bring their health problems with them into old age is an important question for future research.

As a result of societal changes experienced during their lives, today's cohorts of elderly women and men differ in many respects from those of elderly people during the 1990s. There are, for example, cohort changes and changing gender patterns in health-related behaviors such as smoking, with decreased smoking rates among men, and increased among women. Obesity is increasing. With women's increased participation in the labor market, the proportion of housewives has decreased. Living conditions and working environments have improved. Education levels are higher in more recent cohorts, especially among women. How will these changes affect health in old age, and how will these effects differ between women and men?

The study of healthy life expectancy is one way to monitor health changes over time and between cohorts. This thesis looked at pain-free life expectancy. What are the trends for other health indicators, such as disability-free life expectancy or dependency-free life expectancy? And how are the gender differences in healthy life expectancy changing over time?

The fact that men have gained more in life expectancy implies that the population composition is also changing. The increased survival of men, even very frail men, is leading to a greater proportion of men among the oldest old. This implies that gender differences in health might decrease in the future. This, in turn, implies that the probability of having a male spouse among the oldest old will increase. Thus, women may have partners longer in old age. If the proportion of couples among older people increases, this may affect health, well-being, and needs for formal and informal care. More work is needed in this area.

Gender differences in care utilization among the oldest old have not been studied thoroughly. There is no doubt that gender is an influential factor in the complex process of care utilization. Study III revealed interesting gender patterns in regard to physician and dentist visits, and some groups that may be at risk for unmet care needs were identified. Another interesting research approach would be to focus on those who have not visited a physician or dentist during the past 12 months. Are they in good health or can they also be considered at risk for unmet care needs? In coming studies we will also broaden our research perspective to include other forms of care services such as formal social care services and informal care.

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